

# JOURNAL of the American Veterinary Medical Association

FORMERLY

**AMERICAN VETERINARY REVIEW**

(Original Official Organ U. S. Vet. Med. Ass'n.)

EDITED AND PUBLISHED FOR

The American Veterinary Medical Association

PRACTITIONERS' NUMBER

## CONTENTS

|  |     |
|--|-----|
| Editorial.....   | 135 |
| Applications for Membership.....   | 139 |
| Coming Veterinary Meetings.....  | 142 |
| Papers:  |     |
| The Study of the Cells of the Blood as an Aid to the Diagnosis of Hog Cholera—Paul A. Lewis and Richard E. Shope.....            | 145 |
| A Study of the Simultaneous and Serum-Along Methods in the Treatment of Cholera-Infected Hogs—C. N. McBryde and W. B. Niles..... | 153 |
| Field Practice Methods of Immunizing Pigs Against Hog Cholera in the Corn Belt—Henry Hell.....                                   | 171 |
| The Control of Rabies in Indiana—F. H. Brown.....  | 178 |
| Rabies Control in Michigan—B. J. Killham.....  | 183 |
| Clinical Manifestations and Surgical Treatment of Lead Poisoning in the Horse—P. G. MacKintosh.....                              | 193 |
| Diseases of Range Sheep—E. T. Baker.....   | 196 |
| Prevention and Control of Sheep Parasites in Pennsylvania—Henry W. Turner and Joseph G. Moon.....                                | 199 |
| Hookworm Infestation in Dogs (Uncinariasis)—S. W. Haigler.....   | 205 |
| Emergencies Following Automobile Injuries to Small Animals—H. W. Brown.....  | 214 |
| Foreign Bodies in Bovines—E. E. Wegner.....  | 218 |
| Returning the Uterus—E. E. Bittles.....  | 225 |
| Pathological Alterations Observed in Cattle Fed on Special Rations—A. L. Deles.....  | 227 |
| Adenosarcomata of the Kidneys of Chickens—Frank P. Mathews.....  | 238 |
| Clinical and Case Reports:   |     |
| Hematoma of the Ovary of a Cow—L. B. Sholl.....  | 247 |
| Ectopia Cordis—G. A. Handley.....  | 248 |
| Army Veterinary Service.....   | 250 |
| Miscellaneous.....   | 251 |
| Association Meetings.....  | 253 |
| Necrology.....   | 262 |
| Personals.....   | 266 |

Communications relating to publication, subscriptions, advertisements and remittance for the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, as well as matter pertaining to the American Veterinary Medical Association and membership, should be sent to Dr. H. Preston Hoskins, Secretary-Editor, 716 Book Bldg., Detroit, Mich.

\$4.00 per annum

Foreign \$5.00; Canada \$4.25

Single Copies 40 cts. in U. S.

## **5-cc DOSES**

— FOR —

## **BACTERINS MORE HELPFUL**

The larger doses, namely 5 cc, for the larger animals have been used for some years by many veterinarians and our experience in the field under practical conditions shows the added benefit derived from them. The bacterial content of our bacterins per cc has not been changed, but the initial dosage for prophylactic immunization recommended now is 5 cc (formerly 2 cc). The dosage for smaller animals remains at what it has been for many years. There is no increase in price per dose.

---

Write for our new booklet, "THERAPEUTIC SUGGESTIONS AND BULLETIN OF PRICES," which contains modern ideas on the application of biological products as well as other practical suggestions.

**W. F. Straub Laboratories, Inc.**

(Successors to Zell-Straub Laboratories)

5520 Northwest Highway

CHICAGO, ILL.

**Biologics**

—

**Pharmaceuticals**

—

**Specialties**

the  
high  
the  
ad  
po  
re  
on  
the  
Co  
for  
vet  
pra  
7  
disc





**JOURNAL**  
**OF THE**  
**American Veterinary Medical Association**  
**FORMERLY AMERICAN VETERINARY REVIEW**

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 716 Book Building, Detroit: Mich.

T. E. MUNCE, President, Harrisburg, Pa.

M. JACOB, Treasurer, Knoxville, Tenn.

**Executive Board**

GEO. HILTON, 1st District; E. P. ALTHOUSE, 2nd District; L. A. MERILLAT, 3rd District;

J. R. MOHLER, 4th District; C. H. STANGE, Chairman, 5th District;

GEO. H. HART, 6th District; R. S. MACKELLAR, Member-at-Large.

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions.

Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXXIV, N. S. Vol. 27

January, 1929

No. 2

**A SATISFACTORY SITUATION**

As the time arrives when we must write it "1929" instead of "1928," it is perfectly natural to look back and take a sort of inventory of what 1928 has given the veterinary profession in general and the A. V. M. A. in particular. Every method of measurement at our disposal helps to bring us to the conclusion that 1928 will be recorded in veterinary annals as a good year. At the same time, there is every reason to believe that 1929 will be as good a year, or better.

Slowly but surely it is becoming increasingly apparent that the veterinary profession is finding its proper orientation in our highly complicated economic system. The best evidence of this that is available is to be found in the better recognition being accorded members of the profession. The number of responsible positions held by veterinarians is constantly increasing and the recompense in the form of salaries paid veterinarians is likewise on the increase. The best example of this recognition—and at the same time the most recent—is to be had in the action of Congress, at the past session, in making sufficient appropriations for the Department of Agriculture to provide salary increases for veterinarians in the service of the Bureau of Animal Industry, practically all along the line.

The year 1928 passed without a serious outbreak of an animal disease in this country. Foot-and-mouth disease failed to gain

an entrance, thanks to the vigilance of our veterinary watchdogs at all points of possible entry. Hog cholera was held in check through prophylactic vaccination in infected territory. Our serum-producers saw to it, too, that there was an adequate supply of tested serum available at all times at reasonable prices.

The campaign for the eradication of bovine tuberculosis made notable progress during 1928 and the year saw the first state—North Carolina—designated as a “modified accredited area.” This means that the cattle in the state of North Carolina are practically free of tuberculosis.

Abortion undoubtedly continued to take its toll, but in a manner that is characteristically non-spectacular—slowly, insidiously, steadily—like a thief in the night. However, some progress was made, particularly in those states that early recognized the real seriousness of the disease and initiated plans to control it.

The one disease that apparently held its own—or a little better—is rabies. It is difficult to make an accurate estimate of the prevalence of rabies. Figures and data have appeared, from time to time, giving the number of positive cases of the disease diagnosed in different laboratories, the number of human cases of rabies, the number of dogs vaccinated, areas under quarantine and so forth, but there has been no systematic, well-conducted survey of the present situation. One of the principal reasons for this situation undoubtedly is to be found in the division of responsibility for proper control of the disease, as found in different localities. Another weak spot is the lack of the proper machinery for putting existing laws and regulations into effect in most states. The general ignorance of the public on the subject of rabies should not be overlooked in this connection.

This relative freedom of our great live stock industry from the inroads of disease should be credited, first, to the veterinarians, for studying and working out means and methods for preventing disease, and, second, to those owners of live stock who have taken counsel from competent veterinarians for the purpose of avoiding trouble. We know of no better team than the qualified, conscientious veterinarian and his progressive, intelligent client.

Now, what about the American Veterinary Medical Association? What part has it taken or is it taking in all of this program? A conspicuous part and one that is constantly growing larger and more important. It would take too long, and it would be unnecessary repetition to relate here all of the things that were accom-

plished in 1928 through and with the help of the A. V. M. A., its officers and committees.

It will be sufficient to say that these things have been properly recorded in the archives of the Association. A large share of the report of our stewardship is to be found in the proceedings of the Minneapolis meeting, published in the JOURNAL for October, 1928. Incidentally, the Minneapolis meeting, having been the largest in the history of the A. V. M. A., reflected the true situation in the national organization and the profession as a whole. All told, 461 veterinarians applied for admission to membership during the year, a larger number for any one year than we have had for some time. The year 1929 sees a larger number of members in good standing than at any time in the history of the organization. The net-paid circulation of the JOURNAL this month is at the highest point ever to be reached.

On the whole, the present situation is highly satisfactory and the outlook extremely encouraging.

---

### PRESIDENT MUNCE GETTING AROUND

Another veterinarian has found out that the presidency of the American Veterinary Medical Association is a real job and one that demands the giving of a great deal of time, thought and energy. President Munce had hardly returned home from the Minneapolis meeting before he began to receive invitations to visit and address veterinary associations in all parts of the country. Needless to say, it would have been practically impossible to attend all of the meetings to which invitations were received. One person can not be in two or three places at the same time.

One of the first meetings attended was the first fall gathering of the Keystone Veterinary Medical Association in Philadelphia, in September. This organization, by the way, is one of the oldest, if not the oldest, local veterinary association in the United States, if not the world. It was organized October 7, 1882.

On October 23, Dr. Munce attended the annual meeting of the Pennsylvania State Veterinary Medical Association, at Harrisburg. As a matter of fact, he was one of the hosts on this occasion and delivered the address of welcome. November 14 saw Dr. Munce in Boston, at the meeting of the Massachusetts Veterinary Association. This meeting was attended by veterinarians from all of the New England States and those in attend-

ance had a splendid opportunity to hear first-hand, from Dr. Munce, what the A. V. M. A. is doing.

The first week in December, Dr. Munce journeyed to Chicago and delivered three addresses there. The first was before the annual meeting of the Illinois State Veterinary Medical Association. The second was before the U. S. Live Stock Sanitary Association, on the subject of "Suggestions for Rational Control Measures for Bang's Disease." The third address was delivered at the banquet of the National Association of B. A. I. Veterinarians.

Dr. Munce is heavily "booked" for January and February, in fact it is going to take some quick moves to enable him to keep all of his engagements, scattered as they are between Minneapolis, Minnesota, and Chattanooga, Tennessee.

### PLANS FOR DETROIT

*The time:* August 13, 14, 15, 16, 1929.

*The place:* Detroit, Michigan.

*Headquarters:* Book-Cadillac Hotel.

#### BIRD'S-EYE VIEW OF PROGRAM

|           | MONDAY<br>AUG. 12            | TUESDAY<br>AUG. 13                        | WEDNESDAY<br>AUG. 14 | THURSDAY<br>AUG. 15            | FRIDAY<br>AUG. 16 |
|-----------|------------------------------|---|----------------------|--------------------------------|-------------------|
| Morning   | Meetings of Committees       | Opening Session                           | Sectional Meetings   | Sectional Meetings             | Clinic            |
| Afternoon | Meeting of Executive Board   | General Session                           | General Session      | General Session                | Clinic            |
| Evening   | State Association Conference | Alumni Meetings.<br>President's Reception | Banquet              | General Session<br>—<br>Papers |                   |

Dr. W. N. Armstrong, of Concord, Michigan, has been appointed by President Munce to head the Local Committee on Arrangements. Dr. Armstrong is president of the Michigan State Veterinary Medical Association. A majority of the sub-committees are organized and already at work. Dr. B. J. Killham will be in charge of finances. Dr. Ward Giltner will see that the convention gets the proper publicity. Dr. E. E. Patterson will direct the clinics. Dr. C. W. Eddy will have charge of hotel arrangements, Dr. M. J. Smead the banquet and Dr. H. Preston Hoskins the exhibits. Mrs. A. S. Schlingman and Dr. R. F. Vermilya will look after the entertainment of the ladies and gentlemen, respectively. Dr. E. K. Sales will supervise the registration.

## EXECUTIVE BOARD ELECTION

A considerable number of members living in Executive Board District No. 2 have not yet returned the nominating ballots mailed to them on November 12, in connection with the election of a member of the Board to represent the New England States, New York, Pennsylvania, New Jersey and Delaware. About 250 members have voted up to the time when this note is being written. This means that at least twice that number have not yet exercised their franchise. The polls for nominations will be closed on January 12. If you have not yet voted, do so at once!

## APPLICATIONS FOR MEMBERSHIP

(See December, 1928, JOURNAL)

## FIRST LISTING

- AHR, DANIEL M. c/o Bellevue Ranch, Merced, Calif.  
D. V. M., Washington State College, 1921  
Vouchers: J. P. Iverson and A. C. Rosenberger.
- ALEXANDER, OLIVER C. 1123 1/3 South 7th St., Springfield, Ill.  
D. V. M., Chicago Veterinary College, 1915  
Vouchers: C. C. Hastings and J. G. Blum.
- BAXTER, JOSEPH M. 4823 N. Wornock St., Philadelphia, Pa.  
D. V. M., U. S. College of Veterinary Surgeons, 1916  
Vouchers: Thomas Castor and T. E. Munce.
- BERNHARDT, RALPH WALTER Enderlin, N. Dak.  
M. D. C., Chicago Veterinary College, 1911  
Vouchers: E. L. Quitman and A. F. Schalk.
- CAMPBELL, ORA L. Box 308, Astoria, Ill.  
D. V. M., Kansas City Veterinary College, 1914  
Vouchers: John D. Reardon and W. Lester Hollister.
- CILKER, ROBERT ABNER 1414 9th St., Modesto, Calif.  
D. V. M., San Francisco Veterinary College, 1913  
Vouchers: A. C. Rosenberger and H. P. Bonnikson.
- CROSSLAND, RALPH ELDRED Neponset, Ill.  
D. V. M., Chicago Veterinary College, 1916  
Vouchers: C. C. Hastings and Fred B. Jones.
- CURRAN, ROBERT F. Buda, Ill.  
D. V. M., Chicago Veterinary College, 1914  
Vouchers: Fred B. Jones, C. C. Hastings.
- DICKIE, SAMUEL R. Paw Paw, Ill.  
D. V. M., Chicago Veterinary College, 1918  
Vouchers: C. C. Hastings and J. D. Reardon.
- DUCKWORTH, R. E. 828 Euclid Ave., Berkeley, Calif.  
D. V. M., San Francisco Veterinary College, 1915  
Vouchers: A. C. Rosenberger and H. P. Bonnikson.
- ERICKSON, ARTHUR JOHN Toulon, Ill.  
M. D. C., Chicago Veterinary College, 1911  
Vouchers: T. M. Bayler and I. K. Atherton.
- FEERS, ALBERT GURNEY 4140 Second Ave., Los Angeles, Calif.  
M. D. C., Chicago Veterinary College, 1908  
Vouchers: W. L. Curtis and Kenneth G. McKay.

- GARRETT, GEORGE MATLACK 701 S. Walnut St., West Chester, Pa.  
V. M. D., University of Pennsylvania, 1907  
Vouchers: Thos. Castor and T. E. Munce.
- GRAY G. A. Adair, Ill.  
D. V. M., Chicago Veterinary College, 1913  
Vouchers: C. C. Hastings and H. D. Chamberlain.
- GRIESEMER, SAMUEL F. R. F. D. No. 1, Temple, Pa.  
V. M. M., University of Pennsylvania, 1909  
Vouchers: Thos. Castor and T. E. Munce.
- GROSSMAN, HARRY T. 2237 W. Grand Ave., Detroit, Mich.  
D. V. M., Ohio State University, 1917  
Vouchers: R. F. Vermilya and M. A. Ruck.
- HACKLER, HENRY D. 2055 E. Susquehanna Ave., Philadelphia, Pa.  
V. S., Ontario Veterinary College, 1895  
Vouchers: Thos. Castor and T. E. Munce.
- HANNUM, HENRY B. Brandywine Summit, Pa.  
V. M. D., University of Pennsylvania, 1920  
Vouchers: G. A. Dick and Henry W. Peele.
- HAWES, JOHN EVERETT 1000 West Yosemite Ave., Madera, Calif.  
D. V. M., Washington State College, 1920  
Vouchers: J. P. Iverson and A. C. Rosenberger.
- HOPE, FRED S. 148 N. Paxon St., Philadelphia, Pa.  
V. M. D., University of Pennsylvania, 1907  
Vouchers: Thos. Castor and T. E. Munce.
- HORNBAKER, H. R. 759 E. Main St., Galesburg, Ill.  
D. V. M., Kansas City Veterinary College, 1913  
Vouchers: A. C. Bolle and C. C. Hastings.
- HUGHES, E. C. Carlinville, Ill.  
D. V. M., Indiana Veterinary College, 1916  
Vouchers: C. C. Hastings and H. R. Schwarze.
- JONES, KENNETH UTTLEY 901 Second Ave. N., Birmingham, Ala.  
D. V. M., Ohio State University, 1917  
Vouchers: D. A. Piatt and A. Gibson.
- LAIR, M. T. Alexis, Ill.  
D. V. M., McKillip Veterinary College, 1912  
Vouchers: C. C. Hastings and Paul S. Dodd.
- LEAHY, GLENN W. R. 5, Decatur, Ill.  
D. V. M., McKillip Veterinary College, 1915  
Vouchers: C. C. Hastings and T. M. Bayler.
- LEGNER, ERNEST F. 519 N. Hennepin Ave., Dixon, Ill.  
D. V. M., Chicago Veterinary College, 1913  
Vouchers: C. C. Hastings and W. Lester Hollister.
- MALONEY, MICHAEL JOHN 5423 Christian St., Philadelphia, Pa.  
V. M. D., University of Pennsylvania, 1906  
Vouchers: Thos. Castor and T. E. Munce.
- MARQUISS, FLOYD D. 1443 Stannage Ave., Berkeley, Calif.  
D. V. M., San Francisco Veterinary College, 1917  
Vouchers: A. C. Rosenberger and J. P. Iverson.
- O'RURKE, MICHAEL JOHN 720 Valencia St., San Francisco, Calif.  
D. V. S., San Francisco Veterinary College, 1909  
Vouchers: Joseph M. Arburua and John McInnes.
- PUCKETT, L. V. 1136 N. 20th St., Quincy, Ill.  
D. V. M., Indiana Veterinary College, 1918  
Vouchers: C. C. Hastings and Paul S. Dodd.
- ROCKWELL, C. S. 5225 Spruce St., Philadelphia, Pa.  
V. M. D., University of Pennsylvania, 1906  
Vouchers: Thos. Castor and T. E. Munce.



- ROTHERMEL, ROBERT O. 550 N. Fifth St., Reading, Pa.  
V. M. D., University of Pennsylvania, 1902  
Vouchers: Thos. Castor and T. E. Munce.
- SHEETS, CHARLES F. Delphi, Ind.  
D. V. M., Indiana Veterinary College, 1915  
Vouchers: R. C. Julien and R. H. Boyd.
- SHEPHERD, FRED ALLEN 324 Allen St., Belvidere, Ill.  
M. D. C., Chicago Veterinary College, 1904  
Vouchers: H. R. Schwarze and C. C. Hastings.
- STEIGER, CLARENCE MELLVILLE Route A, Box 38, Modesto, Calif.  
D. V. M., San Francisco Veterinary College, 1914  
Vouchers: A. C. Rosenberger and H. P. Bonnikson.
- SWANSON, ANDREW Atkinson, Ill.  
D. V. M., Chicago Veterinary College, 1913  
Vouchers: H. D. Chamberlain and C. C. Hastings.
- THOMAS, WILLIAM W. P. O. Box 563, Merced, Calif.  
D. V. S., Western Veterinary College, 1905  
Vouchers: A. C. Rosenberger and H. P. Bonnikson.
- TURVER, JOHN 1241 E. 12th St., Oakland, Calif.  
D. V. M., San Francisco Veterinary College, 1918  
Vouchers: Nelson E. Clemens and A. C. Rosenberger.
- WHITAKER, ANDREW J. Manteca, Calif.  
V. M. D., University of Pennsylvania, 1918  
Vouchers: A. C. Rosenberger and J. P. Iverson.
- WHITEHEAD, FRANK GEORGE 923 St. Helena Ave., Santa Rosa, Calif.  
V. M. D., University of Pennsylvania, 1911  
Vouchers: A. C. Rosenberger and J. P. Iverson.
- YOWELL, DANIEL A. Virginia, Ill.  
D. V. S., Western Veterinary College, 1905  
Vouchers: H. R. Schwarze and C. C. Hastings.
- ZOLLINGER, JOHN H. No. 1 Chelton Rd., Llanerch, Upper Darby, Pa.  
V. M. D., University of Pennsylvania, 1902  
Vouchers: Thos. Castor and T. E. Munce.

### Applications Pending

#### SECOND LISTING

- Anderson, Martin Edward, 116 Elmwood Ave., Modesto, Calif.  
 Claire, Joseph F., 502 Magnolia Ave., Burbank, Calif.  
 Clark, Wm. A., 1707 So. 7th St., Alhambra, Calif.  
 Harrison, William Edwin, 155 So. Ventura Ave., Ventura, Calif.  
 Klaiber, Richard, 12 N. Elm St., West Carrollton, Ohio.  
 Lahr, Edward C., 301 Wholesale Terminal Bldg., Los Angeles, Calif.  
 McLaughlin, Mac L., 3911 Whittier Blvd., Los Angeles, Calif.  
 Martin, Carl Libby, 149 Elm St., Southbridge, Mass.  
 Metz, Albert Louis, 312 Magnolia Ave., Oxnard, Calif.  
 Miller, J. M., 68 Elm St., Benton Harbor, Mich.  
 Ruff, Lewis A., Marshall, Mich.  
 Scofield, Ralph H., 203 Administration Bldg., Union Stock Yards, Los Angeles, Calif.  
 Smith, Benjamin Hanson, 2112 W. Main, Alhambra, Calif.  
 Van Vranken, Henry S., Burt, Iowa.  
 Worley, Earl R., 6914 Templeton St., Huntington Park, Calif.  
 Xiques, Gustavo Rodriguez, Army Veterinary School, Army Medical Center, Washington, D. C.  
 Younghusband, Allan Wilson, 15 Fifth Ave., Ottawa, Ont.

The amount which shall accompany an application filed this month is \$10.00, which covers membership fee and dues to January 1, 1930, including subscription to the JOURNAL.

## COMING VETERINARY MEETINGS

California State Veterinary Medical Association and University of California Veterinary Conference. University Farm, Davis, Calif. January 2-5, 1929. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

Chicago Veterinary Society. Great Northern Hotel, Chicago, Ill. January 8, 1929. Dr. J. B. Jaffray, Secretary, 2956 Washington Blvd., Chicago, Ill.

Pennsylvania, Conference of Veterinarians at University of. School of Veterinary Medicine, University of Pennsylvania. January 8-9, 1929. Dr. Louis A. Klein, Dean, 39th St. & Woodland Ave., Philadelphia, Pa.

Intermountain Livestock Sanitary Association. Ogden, Utah. January 8-9, 1929. Dr. W. D. Wright, Secretary, 312 Federal Bldg., Ogden, Utah.

Massachusetts Veterinary Association. State Armory, Worcester, Mass. January 9, 1929. Dr. H. W. Jakeman, Secretary, 44 Bromfield St., Boston, Mass.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. January 9, 1929. Dr. H. Preston Hoskins, Secretary, Detroit, Mich.

Ohio State Veterinary Medical Association. Deshler Wallick Hotel, Columbus, Ohio. January 9-10, 1929. Dr. Walter R. Hobbs, Secretary, Ohio State University, Columbus, Ohio.

Kansas Veterinary Medical Association. Topeka, Kans. January 9-10, 1929. Dr. Charles W. Bower, Secretary, 1128 Kansas Ave., Topeka, Kans.

Virginia State Veterinary Medical Association. Richmond, Va. January 10, 1929. Dr. Geo. C. Faville, Secretary, Hampton Institute, Hampton, Va.

Oklahoma State Veterinary Medical Association. Huckins Hotel, Oklahoma City, Okla. January 14-15, 1929. Dr. Frank R. Knotts, Secretary, Stillwater, Okla.

Kansas City Association of Veterinarians. New Baltimore Hotel, Kansas City, Mo. January 15, 1929. Dr. J. D. Ray, Secretary, 400 New Centre Bldg., Kansas City, Mo.

Indiana Veterinary Medical Association. Indianapolis, Ind. January 15-17, 1929. Dr. R. H. Boyd, Secretary, 1422 N. Capitol Ave., Indianapolis, Ind.

- Missouri Special Short Course for Graduate Veterinarians, University of. Columbia, Mo. January 15-18, 1929. Dr. J. W. Connaway, University of Missouri, Columbia, Mo.
- Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. January 16, 1929. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.
- Louisiana State Veterinary Medical Association. Louisiana State University, Baton Rouge, La. January 16-17, 1929. Dr. H. A. Burton, Secretary, Alexandria, La.
- Wisconsin Veterinary Medical Association. Park Hotel, Madison, Wis. January 16-18, 1929. Dr. B. A. Beach, Secretary, Madison, Wis.
- Cornell University, Annual Conference for Veterinarians at. Cornell University, Ithaca, N. Y. January 17-18, 1929. Dr. V. A. Moore, Dean, Cornell University, Ithaca, N. Y.
- Maryland State Veterinary Medical Association. Medical Hall, 1211 Cathedral St., Baltimore, Md. January 17, 1929. Dr. E. M. Pickens, Secretary, College Park, Md.
- Texas, State Veterinary Medical Association of. Fort Worth, Texas. January 21, 1929. Dr. D. Pearce, Secretary, Leonard, Texas.
- South Carolina Association of Veterinarians. Jefferson Hotel, Columbia, S. C. January 22, 1929. Dr. M. R. Blackstock, Secretary, 157 Hampton Ave., Spartanburg, S. C.
- Southwestern Tuberculosis Conference. Texas Hotel, Fort Worth, Texas. January 22-23, 1929. Dr. T. O. Booth, Secretary, 701 Wheat Bldg., Fort Worth, Texas.
- Iowa Veterinary Medical Association. Savery Hotel, Des Moines, Iowa. January 23-25, 1929. (January 22-23 at Des Moines and January 25 at Ames). Dr. C. J. Scott, Secretary, Knoxville, Iowa.
- Tennessee Veterinary Medical Association. Andrew Jackson Hotel, Nashville, Tenn. January 23-24, 1928. Dr. A. C. Topmiller, Secretary, Murfreesboro, Tenn.
- North Carolina State Veterinary Medical Association. Raleigh, N. C. January 23-24, 1929. Dr. W. T. Scarborough, Secretary, 320 S. Blount St., Raleigh, N. C.
- Nevada State Veterinary Association. Reno, Nevada. January 24, 1928. Dr. Edward Records, Secretary, University of Nevada, Reno, Nevada.

- Arkansas Veterinary Medical Association. Hotel Marion, Little Rock, Ark. January 24, 1929. Dr. F. R. Osborn, Secretary, 915 Broadway St., Little Rock, Ark.
- Minnesota State Veterinary Medical Association. Nicollet Hotel, Minneapolis, Minn. January 24-25, 1929. Dr. C. P. Fitch, Secretary, University Farm, St. Paul, Minn.
- Mississippi State Veterinary Medical Association. Mississippi A. & M. College. January 28-29, 1929. Dr. J. T. Alston, Secretary, Tupelo, Miss.
- Michigan State College Short Course for Veterinarians. East Lansing, Mich. January 28-February 1, 1929. Dr. Ward Giltner, Dean, Michigan State College, East Lansing, Mich.
- Michigan State Veterinary Medical Association. Michigan State College, East Lansing, Mich. January 29, 1929. Dr. E. K. Sales, Secretary, 535 Forest St., East Lansing, Mich.
- South Dakota Veterinary Medical Association. Marvin Hughitt Hotel, Huron, S. Dak. January 30-31, 1929. Dr. Ben Anderson, Secretary, Canton, S. Dak.
- New Jersey, Veterinary Medical Association of. Plaza Hotel, Journal Square, Jersey City, N. J. January 31, 1929. Dr. E. R. Cushing, Secretary, New Brunswick, N. J.
- Alabama Veterinary Medical Association and Short Course for Graduate Veterinarians. Auburn, Ala. February 4-9, 1929. Dr. C. A. Cary, Secretary, Auburn, Ala.
- Kansas State Agricultural College Conference for Veterinarians. Kansas State Agricultural College, Manhattan, Kans. February 6-7, 1929. Dr. R. R. Dykstra, Kansas State Agricultural College, Manhattan, Kans.
- Hudson Valley Veterinary Medical Society. Albany, N. Y. February 13, 1929. Dr. J. G. Wills, Secretary, 122 State St., Albany, N. Y.
- Southeastern States Veterinary Medical Association. Hotel Patton, Chattanooga, Tenn. February 15-16, 1929. Dr. M. R. Blackstock, Secretary, 157 Hampton Ave., Spartanburg, S. C.
- Ontario Veterinary Association. Prince George Hotel, Toronto, Ont. February 20, 1929. Dr. H. M. LeGard, Secretary, 223 Main St. N., Weston, Ont.

## THE STUDY OF THE CELLS OF THE BLOOD AS AN AID TO THE DIAGNOSIS OF HOG CHOLERA

By PAUL A. LEWIS and RICHARD E. SHOPE

*Department of Animal Pathology, Rockefeller Institute for Medical  
Research, Princeton, N. J.*

The prompt diagnosis of hog cholera is frequently a matter of importance and is the subject of great uncertainty. Reliance is placed on the history of the outbreak, and especially on the pathological anatomy revealed by the first animals in the herd to succumb. The latter is subject to much limitation as evidence because of the fact that swine seem particularly liable to develop widespread petechial hemorrhages as a consequence of any septicemic condition. In the end certainty is only to be secured by the reinoculation of filtered materials into healthy animals, an expensive and time-consuming procedure. It would seem therefore that any additional clinical evidence which would be precise and readily obtained would be both welcome and useful, even though it might lack the quality of absolute certainty.

Previous studies by various observers have rendered it very probable that a typical attack of hog cholera is accompanied by profound changes in the cellular content of the blood. King and Wilson (1910)<sup>1</sup> observed a progressive moderate loss of erythrocytes and hemoglobin and a definite but not extreme leucopenia. This was confirmed, in 1914, by Dinwiddie,<sup>2</sup> and in 1915, by Lewis, Shuler, McElroy and Ritter.<sup>3</sup> The changes found by these authors were of the same order as those observed King and Wilson but were more pronounced. European observers also have corroborated these results.

It would seem that these results should have a significance in practice, and yet as a matter of fact the blood picture is seldom or never called on as evidence in the study of swine diseases in the field. For this there seem to be several reasons. The lesser perhaps is that the original data to which we refer have never been widely diffused. Of more importance is it that when critically examined the available evidence is not wholly convincing. King and Wilson, for example, found an average decrease in white blood cells of 5,000 per cu. mm. But many animals in this series showed little or no decrease. Lewis and coworkers

---

Received for publication, Sept. 16, 1928.

found a really striking decrease in only one case, to judge by the available abstract report. The decrease in red blood cells develops slowly and is not in principle likely to be of great diagnostic significance.

Of probably equal or greater importance for the adoption of these observations in practice is the fact that the methods of blood examination in current use have been developed for and by practice with humans, particularly for the very refined conditions of modern hospital practice. They are in many respects ill suited to the conditions surrounding veterinary practice in the field.

Our work, the results of which are here reported in abstract, has been conducted with two objects in view. We have sought in the first place to modify the classical methods of blood examination so as to make them useful under conditions of veterinary practice. In this we believe that we have wholly succeeded, at least as far as the study of swine blood in cholera and the diseases apt to be confused with it is concerned. Our further purpose has been to reexamine the blood in hog cholera and those diseases with which it may be confused in the field to determine if there is a characteristic, and hence diagnostically significant, change in its cellular content. Our results with this project strongly suggest that such changes exist, are pronounced, and are likely to be useful. For want of sufficiently varied clinical material we are as yet unable to speak with finality on this phase of our study. We believe, however, that we have advanced the methods to the point where others with material available might wish to test the matter for themselves.

#### METHODS

The task of obtaining blood counts on swine by the usual method, that is, filling the counting pipettes from a skin puncture, was so difficult and time-consuming that it was soon abandoned and a more satisfactory method sought for. The technic finally adopted and used in all of our work here reported is simple, rapid, accurate and makes even distant field cases available for blood examination.

The equipment needed for the blood collection consists of a pair of moderately heavy scissors, some 50-cc round-bottomed, ungraduated, wide-mouthed centrifuge tubes or ordinary wide vials with rubber stoppers, some small rubber bands, and a small



amount of some anticoagulant. For the latter, powdered potassium oxalate has been found very satisfactory by us.

The hog whose blood is to be counted is held in any convenient manner by an assistant and blood is obtained by cutting off a small portion of the end of the tail. The blood is collected in a 50-cc wide-mouthed tube containing 2 mg. of powdered potassium oxalate for each cubic centimeter of blood to be drawn, agitating the tube continuously to insure prompt and complete solution of the oxalate and its thorough mixture with the blood. Our practice has been to keep on hand and in readiness for use a number of these tubes, each containing approximately 10 mg. of powdered potassium oxalate. These are then ready for the receipt of 5 cc of blood and a mark is made on the side of each tube at the 5-cc level. It is better to have a slight excess of potassium oxalate in the tubes than not enough. After the 5 cc of blood have been obtained the tube is stoppered, using a rubber stopper preferably, and hemorrhage from the animal's tail is stopped by wrapping a rubber band about it, near the tip, rather tightly.

Before making a count on the blood, the tube should be agitated again to insure thorough mixture of the corpuscles and plasma which separate in the blood of sick hogs rather rapidly on standing. Then a small amount (0.5 cc is sufficient) is poured out on a clean glass slide and the blood-counting pipettes are filled in the usual manner, using 2 per cent acetic acid as the diluent for the white blood cells and physiological salt solution as the diluent for the red blood corpuscles. The blood film for the differential count can be made in the usual manner using a very small drop of blood from the tube. From here on the counts are conducted after the methods given in any standard textbook on the subject.

The method above described has been given a rather thorough trial in our hands and has been found to be accurate and convenient. It has been checked against counts made by the usual method and found to agree very satisfactorily. We have also determined that counts made on samples of blood that have stood at warm room temperature all day are just as satisfactory as counts made immediately after the blood is drawn, thus making distant field cases available. In our field cases we have, as a rule, drawn the blood in the morning and counted it in the afternoon or evening at the laboratory. However, where an immediate

diagnosis was essential the counts were made on the spot without much inconvenience.

#### OBSERVATIONS AS TO BLOOD CHANGES IN HOG CHOLERA

Non-immune swine raised on the laboratory's farm were used in these experiments. Inoculation with hog cholera virus was in some instances made intraperitoneally and in others subcutaneously or intracutaneously. The mode of inoculation or size of dose of virus used was immaterial to the results as regarded blood-cell alterations. Blood counts in all instances were made on one or more days preceding inoculation to serve as normals for the individual animals. Normal counts as determined on these animals ranged from 6,500,000 to 7,500,000 per cu. mm. for red blood cells and from 14,000 to 24,000 per cu. mm. for leucocytes.

Following inoculation with virus a prompt and marked decrease in leucocytes took place. This was extreme within 48 hours and preceded the establishment of the temperature reaction. In fact, for a period ranging from 24 to 48 hours or longer, it was our only indication that the animal actually had cholera. As the temperature reaction became established the leucocyte count continued to decrease, reaching a low point that was always under 4,000 leucocytes per cu. mm. Here it remained for a period of several days and in acute cases death usually took place during this period. In more chronic cases, at some time around the seventeenth day following inoculation, irregular fluctuations occurred and the counts sometimes went up to 8,000—10,000 leucocytes per cu. mm. At no time, however, did they approach the normal level.

Changes in the number of red blood corpuscles were studied in the same group of animals. Decrease in the number of red blood cells was found to take place. However, the anemia developed more slowly, and was less marked than the leucopenia and in no sense could be considered of as characteristic a significance as the leucopenia.

Study of the fixed blood films indicated that the greatest injury was to the polymorphonuclear leucocytes. At times they were completely absent as studied in the fixed preparations. The leucopenia, however, included the cells of both the polymorphonuclear and lymphocytic series. Large numbers of nucleated red cells appeared at the onset of the anemia and persisted in smaller numbers throughout the disease. A protocol of one of our experi-

TABLE I—Record of blood counts of hog 434, artificially inoculated with hog cholera virus

|        | TOTAL<br>RED<br>BLOOD<br>CELLS | TOTAL<br>WHITE<br>BLOOD<br>CELLS | POLYMORPHO-<br>NUCLEAR<br>NEUTRO-<br>PHILES | POLYMORPHO-<br>NUCLEAR<br>EOSINO-<br>PHILES | POLYMORPHO-<br>NUCLEAR<br>BASOPHILES | LYMPHO-<br>CYTES | MONO-<br>CYTES | ENDO-<br>THELIAL<br>CELLS | ATYPICAL<br>OR QUES-<br>TIONABLE<br>CELLS | NUCLEATED<br>RED<br>BLOOD<br>CELLS | TEMPER-<br>ATURE |
|--------|--------------------------------|----------------------------------|---|---|--------------------------------------|------------------|----------------|---------------------------|---|------------------------------------|------------------|
| 1923   | per cu. mm.                    | per cu. mm.                      | per cu. mm.                                 | per cu. mm.                                 | per cu. mm.                          | per cu. mm.      | per cu. mm.    | per cu. mm.               | per cu. mm.                               | per cu. mm.                        | °C.              |
| May 9  | 6,560,000                      | 23,700                           | 4,977                                       | 1,659                                       | 0                                    | 16,590           | 474            | 0                         | 0   | 0                                  | 38.6             |
| Normal |                                |                                  |   |   |                                      |                  |                |                           |   |                                    |                  |

| Inoculated May 9 with 0.4 cc hog cholera virus 394 intracutaneously (immediately following normal blood count). |           |       |       |     |    |       |     |   |     |       |      |
|---|-----------|-------|-------|-----|----|-------|-----|---|-----|-------|------|
| May 11  | 6,385,000 | 9,600 | 960   | 576 | 0  | 7,776 | 288 | 0 | 0   | 96    | 38.9 |
| May 12  | 6,350,000 | 6,400 | 1,600 | 576 | 0  | 3,584 | 512 | 0 | 128 | 192   | 39.5 |
| May 14  | 6,365,000 | 4,940 | 444   | 296 | 0  | 3,806 | 395 | 0 | 99  | 2,124 | 40.9 |
| May 16  | 5,830,000 | 4,340 | 1,606 | 0   | 0  | 2,387 | 304 | 0 | 43  | 1,042 | 41.4 |
| May 18  | 5,935,000 | 1,480 | 281   | 0   | 0  | 1,154 | 45  | 0 | 0   | 0     | 41.6 |
| May 20  | 5,875,000 | 3,440 | 722   | 0   | 0  | 2,374 | 310 | 0 | 34  | 69    | 41.2 |
| May 22  | 5,000,000 | 2,900 | 145   | 29  | 0  | 2,349 | 377 | 0 | 0   | 58    | 41.6 |
| May 23  | 5,650,000 | 3,040 | 0     | 0   | 0  | 2,766 | 213 | 0 | 61  | 30    | 41.1 |
| May 26  |           | 3,640 |       |     |    |       |     |   |     |       | 40.6 |
| May 29  | 4,575,000 | 2,320 | 70    | 0   | 23 | 2,065 | 162 | 0 | 0   | 0     | 40.7 |

ment animals, typical of the group of eight that have been studied, is included.

While the leucopenia as seen in our experiment animals seemed perfectly characteristic of cholera, it was deemed advisable to obtain data on field cases of the disease as a check measure. This was done and in every case of cholera seen in the field leucopenia was very definite. Our counts on field cases of hog cholera range from 960 to 9,550 leucocytes per cu. mm., with the average at 5,500 per cu. mm.

The administration of virus and hyperimmune serum, the so-called double treatment, to hogs does not produce a leucopenia, so that the leucocyte count is available for use in detecting the cause of trouble in "vaccination breaks." A hog successfully immunized shows no decrease in the number of his leucocytes but, in our experience with several "vaccination breaks," animals developing cholera following immunization with virus and serum show just as characteristic and severe a leucopenia as spontaneous or experimental cases of hog cholera.

#### OBSERVATIONS ON THE LEUCOCYTE REACTION OF SWINE TO OTHER SWINE DISEASES OCCASIONALLY CONFUSED CLINICALLY WITH HOG CHOLERA

Symptomatically hog cholera, at least early in the disease, may be rather easily confused by the practitioner with several other swine diseases. Probably the condition most often suspected, especially in swine becoming sick soon after hog cholera immunization, is hemorrhagic septicemia. We have endeavored to see a spontaneous field case, that was definitely hemorrhagic septicemia, for a long time but have failed to do so. Hence it has been necessary for us to simulate the condition experimentally, using the bipolar organism in order to determine the characteristic type of leucocytic reaction. In two experimentally infected swine a marked and prompt leucocytosis has been observed. In one animal the leucocytes reached 41,000 per cu. mm. and in the other 32,000 per cu. mm. in five hours following subcutaneous inoculation. This leucocytosis was maintained.

In view of these observations it seemed possible that a superinfection of hemorrhagic septicemia on an animal with hog cholera might obscure the characteristic leucocytic findings as regards cholera. That is, it might be expected that the mixture of a leucocytosis-producing infection with one characterized by a leucopenia would result in obscuring the leucopenia. However,

such was found not to be the case. Swine sick with hog cholera and with leucocyte counts of between 3,000 and 4,000 leucocytes per cu. mm. when inoculated with the bipolar organism, instead of exhibiting an increase in leucocytes as might perhaps be expected, developed very promptly a more marked leucopenia. Hence super-infection with a secondary invader will not necessarily obscure the leucocyte picture in hog cholera.

The early clinical picture of acute infectious enteritis of swine may be occasionally confused with hog cholera although the pathological findings become characteristic quite soon. Leucocyte counts on a good-sized series of field cases of infectious enteritis done in Iowa where the condition is quite prevalent indicate that in this condition a moderate leucocytosis is the rule. The counts obtained on field cases ranged from 17,000 to 56,000 leucocytes per cu. mm. The average of the series was 31,000. This work was done with the cooperation of Dr. Fred Crow, of Iowa City, and various members of the Eastern Iowa Veterinary Medical Association. Through the kindness of Dr. Charles Murray and Dr. H. E. Biester, at the Iowa State College, Ames, experimentally induced cases of infectious enteritis were made available to us. Leucocyte counts made on these experimental cases indicated that a slight to moderate leucocytosis was the rule in this condition and the counts agreed very well with those found earlier in field cases. Occasionally in experimental cases a temporary decrease in leucocytes took place soon after infection. This decrease was followed very promptly, however, by a leucocytosis and at no time did the leucocyte count reach points nearly as low as in experimental cases of hog cholera. The findings, as regards the leucocyte reaction in infectious enteritis, are in agreement with earlier unpublished data by Dr. Biester.

A few counts were obtained on field cases of less common conditions which might conceivably be confusing. In heavy ascaris infestation a slight leucocytosis was found to prevail and in no cases was a leucopenia observed. In the obscure condition of swine characterized by a marked posterior paralysis and considered generally to be due to dietary deficiency a moderate leucocytosis was found to be the rule.

One condition to which we have not had access and which is very often difficult to differentiate from cholera early is swine "flu." It is hoped that data will be obtained as to the leucocyte reaction taking place in that condition this fall.

Tentatively, then, it would appear that hog cholera is the only acute infectious swine disease characterized by a decrease in the number of white blood cells. This leucopenia is of such a profound degree as to be of diagnostic importance. It is believed by us that for the present and until contradictory evidence appears, a leucocyte count of 8,000 per cu. mm. or less on three sick animals in a suspected herd indicates clearly that the condition is hog cholera. In our contact with field cases we have encountered two animals with leucocyte counts of around 9,000 per cu. mm. which were definitely hog cholera cases. In these two instances, in which the diagnosis of cholera would have been doubtful, using 8,000 leucocytes per cu. mm. as the diagnostic limit, the point was settled by counting other sick animals in the herd whose leucocyte counts were found to be much lower.

This is a preliminary report, abstract in content, and will be followed soon by a more complete account of our experimental data.

#### REFERENCES

- <sup>1</sup>King, W. E., & Wilson, R. H.: Studies in hog cholera and preventive treatment. *Kans. State Agr. Exp. Sta. Bul.* 171 (1910).  
<sup>2</sup>Dinwiddie R. R.: Studies on the hematology of normal and cholera-infected hogs. *University of Arkansas Agr. Exp. Sta. Bul.* 120 (1914).  
<sup>3</sup>Lewis, L. L., Shuler, W. P., McElroy, C. H., & Ritter, L. B.: Hog cholera. *Exp. Sta. Rec.* xxxii (1915), p. 782.

#### PUBLICATIONS RECEIVED

- Michigan Humane Society, Third Annual Report for 1927. Detroit, Mich., 1928. pp. 36.
- Ministry of Agriculture and Fisheries, Annual Report of Proceedings under the Diseases of Animals Acts for the year 1927. London, England, 1928. pp. 88.
- L'Institut Agricole d'Oka, Son Programme de'Enseignement. La Trappe, Quebec, Canada, 1928. pp. 16.
- Observations on the Pathology of *Bacterium Abortus* Infections. E. T. Hallman, L. B. Sholl and A. L. Delez. (Tech. Bul. 93, Agr. Exp. Sta., Mich. State Coll., E. Lansing, Mich., July, 1928. pp. 19. Illustrated.)
- The Immunization of Dogs. Studies in Dog Distemper, V. P. P. Laidlaw and G. W. Dunkin. Reprint from *Jour. Comp. Path. and Ther.*, xli (1928), pp. 209-227.
- The Intradermal Tuberculin Test in Cattle. J. Basil Buxton and A. Salusbury MacNalty. Medical Research Council, London, England, 1928. pp. 64.
- Keeping Farm Teams at Low Cost. (Leaflet 195, Horse Association of America, Chicago, Ill., 1928. pp. 24. Illustrated.)
- Surgeon General U. S. Army for the fiscal year ending June 30, 1928, Report of the. Washington, D. C., 1928. pp. 400.



# A STUDY OF THE SIMULTANEOUS AND SERUM-ALONE METHODS IN THE TREATMENT OF CHOLERA-INFECTED HOGS\*

By C. N. McBRYDE and W. B. NILES

*U. S. Bureau of Animal Industry*

## INTRODUCTORY

In the treatment of cholera-infected herds, the Bureau of Animal Industry recommends: (1) that the temperatures of all hogs be taken at the time of treatment, (2) that simultaneous treatment be given to all apparently healthy hogs and to those found to have temperatures as high as 104° F., and (3) that hogs having temperatures above 104° F. be given serum-alone treatment, except those which are in the advanced stages of the disease and clearly too sick for treatment.

While some veterinarians follow the above procedure, there are others who give the simultaneous treatment to all hogs in a sick herd regardless of whether the temperatures of the affected animals are above or below 104° F. This difference in procedure in field practice has raised the question whether it does any harm to administer the simultaneous treatment to sick hogs with temperatures above 104° F. In other words, does the injection of a small amount of virus in the case of hogs having high temperatures and presumably already loaded with virus exert any injurious effect? With a view to throwing some light on this question, a series of experiments was carried out, which also served to furnish additional information in regard to the curative value of serum in the earlier stages of acute hog cholera. Another series of experiments was carried out with a view to testing the curative value of serum in the more advanced stages of the disease.

The experiments described in this paper were carried out from time to time, in conjunction with other experimental work, and may be best described under two headings, viz: (1) a comparison of the simultaneous and serum-alone methods in the treatment of infected hogs in the incubative or the early stages of acute hog cholera, and (2) experiments to determine the curative value of serum-alone treatment when given to infected hogs in the later or more advanced stages of acute hog cholera.

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association Minneapolis, Minn., August 7-10, 1928.

**(1) A Comparison of the Simultaneous and Serum-Alone Methods in the Treatment of Infected Hogs in the Incubative or Early Stages of Acute Hog Cholera**

While these experiments varied somewhat in detail, the general plan was to inject a series of susceptible shotes with virus. On the second or third day thereafter, a certain number of the infected shotes were selected, half being treated with serum-alone, the other half being given the simultaneous treatment. A day or two later another lot of the infected pigs was withdrawn, half of these being treated with serum-alone and the other half being given the simultaneous inoculation of serum and virus. The remainder of the original series of infected pigs were left untreated to serve as controls. This plan was not always followed, since in one experiment all of the infected pigs except the two reserved as controls were treated on the third day, and in another experiment, all except the two controls were treated on the fourth day after infection.

Full doses of serum were used in these experiments, in accordance with the recommendations of the Bureau in the treatment of sick herds. In some cases the average field dose of serum was used in comparison with the dose and one-half recommended by the Bureau in the case of pigs showing high temperatures. When simultaneous treatment was given, the usual 2-cc dose of virus was administered.

**EXPERIMENT 1**

On July 23, 1927, eleven susceptible pigs (weighing from 40 to 65 pounds) were injected each with 2 cc of virus. On the second day after injection, most of these pigs showed a rise in temperature, but none were visibly sick; on this day two pigs were given 40 cc each of serum alone and two were given 40 cc each of serum and 2 cc each of virus. On the fourth day after injection, the remaining untreated pigs were all slow, that is, visibly sick, and on this day two of them were given 40 cc each of serum alone and two were given 40 cc each of serum and 2 cc each of virus. Three pigs were left untreated to serve as controls.

The four pigs which were treated on the second day after receiving the virus injection were slow for only one day and recovered in good condition. The three untreated controls all developed the characteristic symptoms of hog cholera. One of the controls was killed for postmortem examination on the twelfth day and showed slight hemorrhagic lesions of hog

cholera, and the other two controls recovered in good condition. Other details of the experiment, together with the results, are shown in table I.

In this experiment it was quite evident that the pigs possessed a considerable degree of natural resistance to the virus of hog cholera and the experiment, therefore, cannot be considered as a very satisfactory one.

#### EXPERIMENT 2

On August 1, 1927, eleven susceptible pigs (weighing from 50 to 60 pounds) were injected with 2 cc each of virus. On the third day after injection, all of these pigs were slow, with temperatures ranging from 103.2 to 105.4° F.; on this day two of the pigs were given 50 cc each of serum alone and two were given 50 cc each of serum and 2 cc each of virus. On the fourth day after injection, another group of four pigs was treated, two receiving 50 cc each of serum alone and two receiving 50 cc each of serum and 2 cc each of virus. The three remaining pigs were left untreated to serve as controls. Table II presents other conditions of the experiment and the results.

In this experiment there was not a great deal of difference in the final outcome between the two methods of treatment, but the results, if anything, were rather in favor of the serum-alone treatment.

#### EXPERIMENT 3

On September 10, 1927, fourteen susceptible pigs (weighing from 50 to 70 pounds) were injected with 2 cc each of virus. On the third day after injection, all these pigs showed elevated temperatures, which ranged as high as 107° F., but none were visibly sick; on this day one pig was given 40 cc and two pigs 60 cc each of serum alone, while one received 40 cc of serum and 2 cc of virus, and two pigs were given 60 cc each of serum with 2 cc each of virus. On the fifth day the temperatures of the remaining, untreated pigs continued high and these pigs were all slow; on this day one of these pigs was given 40 cc and two were given 60 cc of serum alone, while one pig received 40 cc of serum and 2 cc of virus and two pigs were given 60 cc each of serum with 2 cc of virus. The remaining sick pigs were left untreated to serve as controls. The results of this experiment are shown in table III.

Inasmuch as the pigs used in this experiment seemed to possess a certain degree of natural resistance, the experiment was not an altogether satisfactory one. There was little difference, however, in results as regards the two treatments.

TABLE I.—Results of experiment 1. Pigs injected with virus on July 23, 1927, and treated with serum alone or serum and virus, 2 to 4 days later

| No. | WT.<br>(LBS.) | DATE<br>TREATED | INTERVAL<br>BETWEEN VIRUS<br>INJECTION AND<br>TREATMENT | TREATMENT     |               | CONDITION WHEN<br>TREATED |                  | FINAL RESULTS  |
|-----|---------------|-----------------|---|---------------|---------------|---------------------------|------------------|--|
|     |               |                 |   | SERUM<br>(CC) | VIRUS<br>(CC) | TEMP.<br>(°F.)            | SYMPTOMS         |  |
| 44  | 65            | 7-25-27         | 2 days  | 40            |               | 102.4                     | Not visibly sick | Slow for one day; recovered in good condition<br>do  |
| 46  | 60            |                 |   | 40            |               | 102.6                     | do               |  |
| 43  | 65            |                 |   | 40            | 2             | 104.2                     | do               |  |
| 47  | 65            |                 |   | 40            | 2             | 103.2                     | do               |  |
| 45  | 65            | 7-27-27         | 4 days  | 40            |               | 103.4                     | Inappetence      | Slow and off feed for few days; recovered in good condition<br>Slow and off feed for two weeks; recovered in good condition  |
| 51  | 60            |                 |   | 40            |               | 105.4                     | do               |  |
| 48  | 60            |                 |   | 40            | 2             | 105.8                     | do               |  |
| 49  | 60            |                 |   | 40            | 2             | 104.6                     | do               |  |
| 50  | 40            | Controls        |   | None          | None          |                           |                  | Slow and off feed for two weeks; recovered in good condition<br>Hog cholera; killed on 12th day; hemorrhagic lesions<br>Slow and off feed for two weeks; recovered in good condition |
| 52  | 40            |                 |   |               |               |                           |                  |  |
| 53  | 40            |                 |   |               |               |                           |                  |  |

TABLE II.—Results of experiment 2. Pigs injected with virus on August 1, 1927, and treated with serum alone or serum and virus, 3 to 4 days later

| No. | WT.<br>(LBS.) | DATE<br>TREATED | INTERVAL<br>BETWEEN VIRUS<br>INJECTION AND<br>TREATMENT | TREATMENT     |               | CONDITION WHEN<br>TREATED |             | FINAL RESULTS  |
|-----|---------------|-----------------|---|---------------|---------------|---------------------------|-------------|--|
|     |               |                 |   | SERUM<br>(cc) | VIRUS<br>(cc) | TEMP.<br>(°F.)            | SYMPTOMS    |  |
| 59  | 60            | 8-4-27          | 3 days  | 50            |               | 104.8                     | Inappetence | Slow and off feed for few days; recovered in good condition<br>do<br>do<br>do  |
| 62  | 55            |                 |   | 50            |               | 105.0                     | do          |  |
| 64  | 60            |                 |   | 50            | 2             | 104.8                     | do          |  |
| 65  | 60            |                 |   | 50            | 2             | 105.4                     | do          |  |
| 63  | 55            | 8-5-27          | 4 days  | 50            |               | 105.0                     | do          | Slow and off feed for two weeks; recovered in good condition<br>do<br>Subacute hog cholera; died on 24th day after treatment<br>Slow and off feed for about two weeks; recovered in good condition |
| 66  | 55            |                 |   | 50            |               | 104.4                     | do          |  |
| 60  | 50            |                 |   | 50            | 2             | 104.6                     | do          |  |
| 61  | 60            |                 |   | 50            | 2             | 104.4                     | do          |  |
| 77  | 50            | Controls        |   | None          | None          |                           |             | Acute hog cholera; killed for virus 7th day after injection<br>do<br>do  |
| 78  | 55            |                 |   |               |               |                           |             |  |
| 79  | 55            |                 |   |               |               |                           |             |  |

TABLE III.—Results of experiment 3. Pigs injected with virus on September 10, 1927, and treated with serum alone or serum and virus, 3 to 5 days later

| No. | WT.<br>(LBS.) | DATE<br>TREATED | INTERVAL<br>BETWEEN INJECTION AND<br>TREATMENT | TREATMENT     |               | CONDITION WHEN<br>TREATED |                  | FINAL RESULTS  |
|-----|---------------|-----------------|--|---------------|---------------|---------------------------|------------------|--|
|     |               |                 |  | SERUM<br>(cc) | VIRUS<br>(cc) | TEMP.<br>(°F.)            | SYMPTOMS         |  |
| 143 | 60            |                 |  | 40            |               | 105.0                     | Not visibly sick | Slow and off feed for few days; recovered in good condition                  |
| 136 | 70            |                 |  | 60            |               | 107.0                     | do               | do   |
| 138 | 60            |                 |  | 60            |               | 106.4                     | do               | do   |
| 139 | 60            | 9-13-27         | 3 days   | 40            | 2             | 105.0                     | do               | Slow and off feed for about 3 weeks; recovered in good condition             |
| 140 | 70            |                 |  | 60            | 2             | 106.0                     | do               | Acute hog cholera; killed when moribund 18th day after treatment             |
| 142 | 70            |                 |  | 60            | 2             | 105.8                     | do               | Slow and off feed for few days; recovered in good condition                  |
| 144 | 60            |                 |  | 40            |               | 104.0                     | Inappetence      | do   |
| 133 | 50            |                 |  | 60            |               | 107.0                     | do               | Acute hog cholera; died on 3rd day after treatment                           |
| 141 | 70            |                 |  | 60            |               | 104.0                     | do               | Subacute hog cholera; died on 28th day after treatment                       |
| 135 | 50            | 9-15-27         | 5 days   | 40            | 2             | 104.0                     | do               | Slow and off feed for few days; recovered in good condition                  |
| 131 | 70            |                 |  | 60            | 2             | 106.0                     | do               | Subacute hog cholera; killed in worthless condition 25th day after treatment |
| 137 | 70            |                 |  | 60            | 2             | 104.2                     | do               | Slow and off feed for few days; recovered in good condition                  |
| 132 | 70            | Controls        |  | None          | None          |                           |                  | Subacute hog cholera; died on 23rd day after injection                       |
| 134 | 70            |                 |  |               |               |                           |                  | Subacute hog cholera; died on 38th day after injection                       |



## EXPERIMENT 4

On October 1, 1927, ten pigs (weighing from 45 to 60 pounds) were injected with 2 cc each of virus. These pigs were all slow on the third day, with temperatures ranging from 105° to 107.6° F. and on this day four were given 50 cc each of serum alone and four were given 50 cc each of serum with 2 cc of virus, two being left untreated to serve as controls. The results of this experiment are shown in table IV.

In this experiment there was very little difference in the two methods of treatment, although the results were apparently somewhat better when serum and virus were given. The pigs in this experiment were highly susceptible, which made the experiment a very satisfactory one.

## EXPERIMENT 5

On December 6, 1927, eight pigs (weighing from 40 to 95 pounds) were injected with 2 cc each of virus. These pigs were all slow on the fourth day, with temperatures ranging from 103.8 to 107° F.; on this day three pigs were given 60 cc each of serum alone and three were given 60 cc each of serum and 2 cc each of virus. Two of the pigs were left untreated to serve as controls. The results of this experiment are shown in table V.

In this experiment, as in the preceding experiments, little difference could be noted in the results following the two methods of treatment, although any observable difference seemed to favor the serum-virus treatment.

**(2) Experiments to Determine the Curative Value of Serum-Alone Treatment when Administered to Infected Hogs in the Later or More Advanced Stages of Acute Hog Cholera**

In a series of experiments, conducted during 1915, the therapeutic value of very large doses of serum was tested. In these experiments, susceptible shotes, weighing from 75 to 100 pounds, were injected with virus and were later given subcutaneous injections of from 100 to 300 cc of serum, after the lapse of 5, 6, 7, or 8 days. Untreated control pigs were left in each experiment. The experiments were similar to those already described, except that serum alone was given, the disease was allowed to progress further before treatment was administered, and much larger doses of serum were used.

TABLE IV.—Results of experiment 4. Pigs injected with virus on October 1, 1927, and treated with serum alone or serum and virus, 3 days later

| No. | WT.<br>(LBS.) | DATE<br>TREATED | INTERVAL<br>BETWEEN VIRUS<br>INJECTION AND<br>TREATMENT | TREATMENT     |               | CONDITION WHEN<br>TREATED |             | FINAL RESULTS   |
|-----|---------------|-----------------|---|---------------|---------------|---------------------------|-------------|---|
|     |               |                 |   | SERUM<br>(cc) | VIRUS<br>(cc) | TEMP.<br>(°F.)            | SYMPTOMS    |   |
| 173 | 50            |                 |   | 50            |               | 106.0                     | Inappetence | Acute hog cholera; died on 6th day after treatment                  |
| 174 | 60            |                 |   | 50            |               | 106.8                     | do          | Acute hog cholera; died on 17th day after treatment                 |
| 178 | 50            |                 |   | 50            |               | 107.6                     | do          | Acute hog cholera; died on 14th day after treatment                 |
| 180 | 45            |                 |   | 50            |               | 105.0                     | do          | Slow and off feed for about two weeks; recovered in fair condition  |
| 172 | 45            | 10-4-27         | 3 days  | 50            | 2             | 106.0                     | do          | Slow and off feed for about two weeks; recovered in good condition  |
| 175 | 60            |                 |   | 50            | 2             | 105.4                     | do          | Acute hog cholera; killed when moribund 16th day after treatment    |
| 176 | 45            |                 |   | 50            | 2             | 107.4                     | do          | Acute hog cholera; died on 15th day after treatment                 |
| 177 | 45            |                 |   | 50            | 2             | 105.0                     | do          | Slow and off feed for about two weeks; recovered in good condition  |
| 171 | 45            | Controls        |   | None          | None          |                           |             | Acute hog cholera; killed when moribund on 12th day after injection |
| 179 | 45            |                 |   |               |               |                           |             | Acute hog cholera; died on 8th day after injection                  |

TABLE V.—Results of experiment 5. Pigs injected with virus on December 6, 1927, and treated with serum alone or serum and virus, 4 days later

| No. | Wt.<br>(lbs.) | DATE<br>TREATED | INTERVAL<br>BETWEEN INJECTION AND<br>TREATMENT | TREATMENT     |               | CONDITION WHEN<br>TREATED |          | FINAL RESULTS  |
|-----|---------------|-----------------|--|---------------|---------------|---------------------------|----------|--|
|     |               |                 |  | SERUM<br>(cc) | VIRUS<br>(cc) | TEMP.<br>(°F.)            | SYMPTOMS |  |
| 290 | 80            |                 |  | 60            |               | 107.0                     | Anorexia | Subacute hog cholera; killed in worthless condition 32nd day after treatment |
| 293 | 60            |                 |  | 60            |               | 105.8                     | do       | Acute hog cholera; killed when moribund 9th day after treatment              |
| 294 | 60            | 12-10-27        | 4 days   | 60            |               | 105.6                     | do       | Subacute hog cholera; recovered in fair condition                            |
| 291 | 80            |                 |  | 60            | 2             | 106.0                     | do       | Slow and off feed for about 3 weeks; recovered in good condition             |
| 292 | 90            |                 |  | 60            | 2             | 106.0                     | do       | do   |
| 295 | 40            |                 |  | 60            | 2             | 103.8                     | do       | Subacute hog cholera; recovered in fair condition                            |
| 288 | 45            | Controls        |  | None          | None          |                           |          | Acute hog cholera; killed when moribund on 13th day after injection          |
| 289 | 95            |                 |  | None          | None          |                           |          | Acute hog cholera; died on 12th day after injection                          |

In these experiments, the animals, when treated, were all visibly sick, with temperatures ranging from 105.3° to 107.4° F. They had passed beyond the incubative stage of the disease and might be considered to be at the height of the disease. In view of the fact that the serum treatment was not administered until from five to eight days after infection occurred, it was not expected that many of the animals would be saved, even with large doses of serum, and, as a matter of fact, all of the shotese in these experiments died; furthermore, they did not outlive the untreated controls. The results are shown in tables VI and VII.

Two experiments were carried out in 1916, in which a comparison was made of the subcutaneous and intravenous methods of administering serum to cholera-infected pigs. This was done on the supposition that intravenous injections of serum might take effect more quickly and prove to be more effective in the treatment of sick pigs.

In these experiments, shotese weighing from 55 to 120 pounds were injected with virus and were later given subcutaneous or intravenous injections of serum, after the lapse of 4, 6, 7, or 8 days. Although comparatively large doses of serum were used, the intravenous injections gave no better results than the subcutaneous injections and practically all of the pigs which were treated after the fourth day died, irrespective of whether they received subcutaneous or intravenous injections. The results are shown in tables VIII and IX.

#### SUMMARY AND DISCUSSION OF RESULTS

In experiments 1 to 5, inclusive, which were carried out in order to compare the simultaneous and serum-alone methods in the treatment of cholera-infected hogs, the results may be summarized as follows:

Twenty-one pigs in the incubative or the early stages of hog cholera (i. e., within two to five days after receiving injections of hog cholera virus) were given serum-alone treatment, using ample doses of serum. At the time of treatment, all of these pigs showed some elevation in temperature, sixteen showed visible symptoms of sickness, and five were not yet visibly sick. Twelve of these pigs (57.14 per cent) recovered in good condition, two (9.52 per cent) recovered in fair condition, and seven (33.33 + per cent) died or were killed in worthless condition.

Twenty-one pigs in the incubative or the early stages of hog cholera (i. e., within two to five days after receiving injections



TABLE VII.—Results of an experiment in which pigs were injected with virus on September 17, 1915, and treated with large doses of serum alone, 5 to 7 days later

| No.  | Wt.<br>(lbs.) | Date<br>Treated | Interval<br>Between Virus<br>Injection and<br>Treatment | Treatment  | Condition when Treated |                    | Final Results                          |
|------|---------------|-----------------|---|------------|------------------------|--------------------|--|
|      |               |                 |   | Serum (cc) | Temp.<br>(°F.)         | Symptoms           |  |
|      |               |                 |   |            |                        |                    |  |
| 2265 | 80            | 9-22-15         | 5 days  | 300        | 106.4                  | Visibly sick<br>do | Died on 10th day after treatment<br>do |
| 2269 | 85            |                 |   | 300        | 106.5                  |                    |  |
| 2263 | 80            | 9-23-15         | 6 days  | 300        | 105.8                  | do                 | Died on 12th day after treatment       |
| 2264 | 85            |                 |   | 300        | 106.1                  | do                 | Died on 10th day after treatment       |
| 2266 | 85            | 9-24-15         | 7 days  | 300        | 106.3                  | do                 | Died on 13th day after treatment       |
| 2267 | 80            |                 |   | 300        | 105.3                  | do                 | Died on 10th day after treatment       |
| 2268 | 80            | Controls        |   | None       |                        |                    | Died on 9th day after injection        |
| 2270 | 85            |                 |   |            |                        |                    | Died on 13th day after injection       |



TABLE VIII.—Results of an experiment in which pigs were injected with virus on January 21, 1916, and later given subcutaneous or intravenous injections of serum

| No.  | WT.<br>(LBS.) | DATE<br>TREATED | INTERVAL<br>BETWEEN VIRUS<br>INJECTION AND<br>TREATMENT | SERUM<br>DOSE<br>(CC) | METHOD<br>OF<br>ADMINIS-<br>TRATION | CONDITION WHEN<br>TREATED |              | FINAL RESULTS  |
|------|---------------|-----------------|---|-----------------------|-------------------------------------|---------------------------|--------------|--|
|      |               |                 |   |                       |                                     | TEMP.<br>(°F.)            | SYMPTOMS     |  |
| 3488 | 80            | 1-27-16         | 6 days  | 60                    | Subcut.                             | 106.0                     | Visibly sick | Acute hog cholera; died on 7th day after treatment     |
| 3483 | 65            |                 |   | 60                    | Intrav.                             | 106.0                     | do           | Acute hog cholera; died on 8th day after treatment     |
| 3487 | 55            | 1-28-16         | 7 days  | 60                    | Intrav.                             | 106.8                     | do           | Subacute hog cholera; recovered in worthless condition |
| 3485 | 120           | 2-2-16          | 12 days   | 60                    | Intrav.                             | 106.4                     | Very sick    | Acute hog cholera; died on same day when treated       |
| 3482 | 60            |                 |   | None                  |                                     |                           |              | Acute hog cholera; died on 22nd day after injection    |
| 3484 | 75            | Controls        |   |                       |                                     |                           |              | Acute hog cholera; died on 23rd day after injection    |
| 3486 | 55            |                 |   |                       |                                     |                           |              | Acute hog cholera; died on 19th day after injection    |

TABLE IX.—Results of an experiment in which pigs were injected with virus on February 1, 1916, and later given subcutaneous or intravenous injections of serum

| No.  | Wt.<br>(LBS.) | DATE<br>TREATED | INTERVAL<br>BETWEEN VIRUS<br>INJECTION AND<br>TREATMENT | SERUM<br>DOSE<br>(CC) | METHOD<br>OF<br>ADMINIS-<br>TRATION | CONDITION WHEN<br>TREATED |              | FINAL RESULTS  |
|------|---------------|-----------------|---|-----------------------|-------------------------------------|---------------------------|--------------|--|
|      |               |                 |   |                       |                                     | TEMP.<br>(°F.)            | SYMPTOMS     |  |
| 3489 | 70            | 2-5-16          | 4 days  | 70                    | Subcut.                             | 105.8                     | Visibly sick | Slow and off feed for almost ten days; recovered in good condition |
| 3495 | 80            |                 |   | 70                    | Intrav.                             | 106.0                     | do           | do   |
| 3491 | 90            | 2-7-16          | 6 days  | 80                    | Subcut.                             | 104.2                     | do           | Acute hog cholera; died on 14th day after treatment                |
| 3494 | 70            |                 |   | 80                    | Intrav.                             | 104.6                     | do           | Slow and off feed for about ten days; recovered in fair condition  |
| 3492 | 85            | 2-9-16          | 8 days  | 70                    | Intrav.                             | 105.8                     | do           | Acute hog cholera; died on 7th day after treatment                 |
| 3490 | 90            |                 |   |                       |                                     |                           |              | Acute hog cholera; died on 12th day after treatment                |
| 3493 | 85            | Controls        |   |                       |                                     |                           |              | do   |
| 3497 | 65            |                 |   | None                  |                                     |                           |              | Acute hog cholera; died on 11th day after treatment                |

of hog cholera virus) were given simultaneous treatment, using ample doses of serum and the usual 2-cc dose of virus. At the time of treatment all of these pigs were showing some elevation in temperature, sixteen showed visible symptoms of sickness, and five were not yet visibly sick. Fourteen of these pigs (66.66 + per cent) recovered in good condition, one (4.76 per cent) recovered in fair condition, and six (28.57 per cent) died or were killed in worthless condition.

In comparing the two methods of treatment, the results, if anything, were slightly better where the simultaneous method was used, that is to say, a somewhat larger percentage of the pigs recovered in good condition. In seeking an explanation of why this should be so, it seems not unreasonable to assume that the additional virus or antigen which these pigs received may have led to a more rapid production of antibodies.

In the same experiments, fourteen pigs with temperatures of 104° F. or over were given serum-alone treatment and of this number nine (64.28 per cent) made good recoveries. Twenty pigs with temperatures of 104° F. or over were given simultaneous treatment and of this number fourteen (70 per cent) made good recoveries. These last results would seem to be sufficiently definite to prove quite conclusively that the use of the simultaneous method is *not* contraindicated in the case of cholera-infected hogs with temperatures of 104° F. or over.

In considering the therapeutic value of serum treatment in the incubative or earlier stages of hog cholera, the pigs which received serum alone may be combined with those which received serum and virus. This may be done in view of the fact that there was not a great deal of difference in the therapeutic value of the two methods of treatment. When the two groups of pigs are combined, the results are as follows: 4 pigs were treated on the second day after infection, with 100 per cent recoveries; 18 pigs were treated on the third day after infection, with 61 per cent recoveries; 14 pigs were treated on the fourth day after infection, with 57 per cent recoveries; six pigs were treated on the fifth day after infection, with 50 per cent recoveries. In calculating the percentage of recoveries, only those pigs which recovered in good condition have been considered. It will be seen from these figures that the percentage of good recoveries decreased progressively with the lengthening of the period of infection and that after the lapse of four days only 50 per cent of the treated pigs made good recoveries.

In the second group of experiments, there were two experiments designed to test the therapeutic value of large doses of serum in the later or more advanced stages of acute hog cholera. Ten shotes, weighing from 75 to 100 pounds, were given subcutaneous injections of 100 to 300 cc of anti-hog cholera serum within 5, 6, 7, or 8 days after infection. These shotes were all visibly sick at the time of treatment, with temperatures ranging from 105.3° to 107.4°, and all succumbed to hog cholera in spite of the very large doses of serum that were given.

In the last two experiments in the second group, the subcutaneous and intravenous methods of administering serum were compared. Nine shotes, weighing from 55 to 120 pounds, were given either subcutaneous or intravenous injections of serum from four to twelve days after infection, the dose of serum varying from 60 to 80 cc, according to the size of the animal. These animals were visibly sick when treated, with temperatures ranging from 104.2 to 106.8° F. Five of these shotes died of acute hog cholera, one recovered in worthless condition, one recovered in fair condition, and two recovered in good condition. The two which recovered in good condition were treated on the fourth day after infection, one receiving a subcutaneous and the other an intravenous injection of serum. The intravenous injections of serum appeared to yield no better results than did the subcutaneous.

From the results that have just been stated, it would appear that there is, or can be, very little hope of saving pigs when serum is administered later than four or five days after the date of actual infection and that even very large doses of serum (100 to 300 cc) are then of no avail. These results agree quite closely with those obtained in earlier experiments on the curative value of anti-hog cholera serum, reported in Bureau of Animal Industry Bulletin 102, published in 1907. In the latter bulletin, in referring to the immunizing value of anti-hog cholera serum, the following statement was made.

Serum may also be expected to prevent the death of hogs when it is administered in moderate doses within four days after infection actually takes place. Later than this it is probable that the serum in virulent attacks of hog cholera will do little good, even though comparatively large doses are given."

The results recorded in the present paper serve to confirm the correctness of the foregoing statement

In connection with the treatment of cholera-infected herds, attention should be called to the very great importance of making

a correct and positive diagnosis of uncomplicated hog cholera before administering the simultaneous treatment. If a herd is not infected with hog cholera but with some other disease, or is infected with cholera, complicated by necrotic enteritis, harm might result from injecting serum and virus, whereas if serum were given without virus no harm could result from the treatment. In view of the difficulty which exists at times in making a positive diagnosis of uncomplicated hog cholera, a considerable amount of caution should be exercised by the practicing veterinarian in the treatment of sick herds and each and every herd should be carefully studied before deciding upon which treatment should be used. If there should be any question in the veterinarian's mind in regard to the diagnosis, or should there be any indication of complications in addition to cholera, it would unquestionably be better, in such cases, to administer serum alone. This point is deserving of especial emphasis, for undoubtedly many herds are given serum and virus which should receive only serum.

Another point that should be taken into consideration, in connection with the treatment of cholera-infected herds, is the question of subsequent immunity. While the experiments recorded in this paper do not indicate that there is any particular advantage in using the simultaneous method rather than serum alone in the treatment of sick herds, as far as the percentage of recoveries is concerned, there is, nevertheless, a distinct advantage in favor of the simultaneous treatment because it insures a permanent immunity, whereas the serum-alone treatment does not insure such immunity. In the case of a cholera-infected herd, it is impossible to know, in the case of the individual pig, when infection actually occurs or to know with absolute certainty whether every pig has picked up the infection. When cholera makes its appearance in a herd, it is possible that all of the pigs in the herd may not pick up the virus and if serum alone be given to those pigs which do not have the virus or antigen in their bodies, they will receive only a temporary or passive immunity and these pigs within a short time will again become susceptible to infection. This was well shown in an extensive series of field experiments, carried out by the Bureau during 1913, 1914 and 1915, in which the simultaneous and serum-alone methods were compared in the treatment of infected herds; in these experiments there was little difference in results as far as the losses from cholera were concerned, but there was a notice-

able difference in the subsequent immunity of the treated hogs, for when serum-alone treatment was used there was more or less recurrence of cholera among the treated hogs, whereas there were comparatively few recurrences when simultaneous treatment was administered.

In view of the experience just referred to and those described in the present paper, there would seem to be no question as to the advisability of using the simultaneous method in the treatment of cholera-infected herds provided there are no secondary infections or complications.

#### CONCLUSIONS

1. Simultaneous treatment is *not* contraindicated in the treatment of cholera-infected hogs, regardless of whether their temperatures are above 104° F., and is to be recommended in the treatment of infected herds *provided* there are no secondary infections or complications.

2. The curative value of anti-hog cholera serum appears to diminish progressively with the lengthening of the period of infection and after the lapse of four or five days from the time of actual infection the administration of serum is of little benefit, even though large doses be given.

3. In the later or more advanced stages of hog cholera, the curative value of serum appears to be no greater when given intravenously than when given subcutaneously.

---

#### American Royal a Success

The American Royal Livestock Show, held in Kansas City, November 17-24, 1928, was the most successful ever held. There was a record entry of all classes of animals, and a record crowd of spectators attended the various performances.

The American Royal horse show has become one of the great features of the year for Kansas City and surrounding territory. Practically all of the good show strings in this country gather here to compete for the wealth of prizes offered. Many veterinarians throughout the Middle West were visitors at the Show this year. They were drawn to Kansas City by the double attraction of the American Royal and the meeting of the Missouri Valley Veterinary Association. Reduced rates were effective on the railroads throughout the territory.



## FIELD PRACTICE METHODS OF IMMUNIZING PIGS AGAINST HOG CHOLERA IN THE CORN BELT\*

*By HENRY HELL, Wilton Junction, Iowa*

The subject matter to be assembled here for consideration will be presented from the viewpoint of the Corn Belt practitioner who immunizes 10,000 or more pigs during the calendar year and is dependent on hog practice for the major portion of his yearly earnings, rather than from the viewpoint of the research worker or the experiment farm worker.

The average practitioner is not so keen for working out new methods, as he is for the perfection of those now in use and a thorough knowledge of these methods. The modes of procedure to be outlined are those that have survived the test of time during the past seventeen years that serum and virus have been used in commercial quantities in the field of practice.

Many of the things offered here may be so commonplace as to be termed old stuff but their survival of the test of time should qualify them as worthy of consideration. We feel that there is great need to work toward uniform methods in the administration of serum and virus in the field of practice, in order that we may better equip ourselves to avoid the pitfalls and stumbling blocks that have ever been with us in this work, with our ultimate goal the ability to go through a whole year's vaccination work without having to make a single post-vaccination trouble call. It is only through the perfection of time-tried methods that we may hope to achieve this ultimate goal.

In proceeding let us bear in mind the prescription of Dr. E. T. Baker. Take a thin dime's worth of theory and mix it with ninety cents' worth of actual experience and use it freely in our day's work. And again let us take into consideration the words of Dr. Charles R. Bardeen, dean of the Medical School of the University of Wisconsin, when he said before the Congress on Medical Education, at Chicago, Feb. 8, 1928: "We need the return of the private practitioner as a personal preceptor in medical education."

Let those of us who are in private practice ask ourselves this question: Shall we take a greater interest in shaping the future

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

of our chosen profession by contributing a record of our humble part in the drama of progress and make for ourselves and our successors a definite place for the clinical veterinarian? There are many phases of field practice. We shall consider them in the order of their importance.

#### THE HOG AND HIS ENVIRONMENT

In the Corn Belt we have come to the conclusion that in the past we have been grossly negligent in the consideration of the hog and his surroundings. But in the past few years, we have learned to consider the hog and his surroundings as one of the most important factors in the success or failure of immunization of pigs against hog cholera with the serum and virus treatment. The history of the hog-lot should receive careful attention.

What success did this man have raising a herd of hogs to maturity in this same lot last year, and in years previous? How does this season compare with the previous ones with relation to the prevalence of the various pen infections?

What is the history during the previous years as to the presence of hog cholera, necrotic enteritis, mixed infections, jaundice, and ascaris or other verminous infestations? Sanitation is a big factor. Filth, lack of ventilation and surface drainage, all must be subjected to careful consideration.

#### THE HERD

The herd must be subjected to a careful analysis. Our first thought is directed toward the thrift of the herd. If any condition prevails that interferes with the thrift of the herd, may this be feeding error, lack of sanitation, or presence of disease or parasitic infestation? The presence of any condition that causes the herd to be unthrifty should serve as a good reason that the condition should be corrected before the herd is subjected to the serum and virus immunization process.

Necrotic enteritis, I believe, stands today as the greatest contraindication to the use of hog cholera virus. Whether the cause of enteritis produces a hypersusceptibility to hog cholera virus or otherwise incapacitates the hog to withstand virus infection is not clear at this time. But we do know that we do get in these herds a virus reaction from seven to nine days after vaccination that causes the owner to conclude that you have done him a pretty poor job of vaccination.

Hog cholera, present in the incubative stage, will cause you to wonder just why you should have a virus reaction from the

second to the sixth day after vaccination. Mixed infections, jaundice and verminous infestations will continue the herd in an unthrifty condition and cause the owner to say that the hogs failed to thrive after vaccination.

#### BEST AGE FOR IMMUNIZATION

The age when the hog is best suited for immunization has been the subject of a great deal of discussion, but, at the present time, I believe that we are safe in saying that 95 per cent of the Corn Belt pigs that are immunized are treated "shortly after weaning time." This gives us pigs that are from eight to twelve weeks old and weighing from 30 to 60 pounds. About two weeks after weaning time, when the pig has grown accustomed to his new way of hustling for a living, is probably the most suitable age for conferring a positive and lasting immunity.

Considerable work has been done in late years toward perfecting baby-pig vaccination. Our experience gained from vaccinating odd litters of all ages below weaning age has not given us much encouragement toward adopting the younger pig as our best subject for immunization. We still regard the 30- to 60-pound pig as the ideal age and weight on which to confer a positive and lasting immunity.

#### SERUM

The outstanding qualifications of this product can well be summed up in two words, potency and purity. Potency<sup>9</sup> is dependent on the use of a hypering virus of a high virulency and on the type and individuality of the bleeder hog. Purity is dependent on the handling of the blood after it is taken from the bleeder hog.

Contamination of serum may take place with either the producer or the practitioner. During the past seven or eight years that clear serum has been used, considerable discussion has been indulged in as to the superiority or inferiority of this product over the defibrinated-blood serum. Nothing has occurred in the field of practice to show that one is superior to the other and that the process of centrifuging or defibrinating has any bearing toward altering the original qualities of the serum. Any difference that prevails must be said to be commercial or the likes or dislikes of the individual.

#### CARE OF SERUM

Serum should be used as fresh as possible. While there is no rapid deterioration in serum, it does not improve with age. So,

in order to gain the benefit of the doubt, use it as fresh as possible. Constant refrigeration is receiving more attention than it did in years past, as well as shipping only on night trains during the summer months, storing in a refrigerator immediately on arrival and transporting to and from the farmstead in a portable auto ice-box, all have become necessities in conducting a successful serum practice.

#### DOSAGE OF SERUM

The dosage of serum should be at all times liberal and the weight of the hog should never be underestimated. Violation of these two things is said to be responsible for more post-vaccination trouble than all others put together. The weakling in the herd should receive a relatively larger dose of serum than his thrifty pen-mate.

#### VIRUS

The virulency of simultaneous virus is probably the most important factor in conferring a positive and lasting immunity with the simultaneous method. First of all, the virus must be of the most virulent type and must be relatively fresh and not have been exposed to sunlight and high temperature for any length of time. It is pretty generally believed that if virus is allowed to remain at a temperature of 80° F. or over, that the one-half of one per cent phenol will affect the virulency of the virus. Virus should be regarded as a more perishable product than serum and should be handled with utmost care not to expose it to high temperatures.

#### DOSAGE

From what we can learn from commercial serum firms, it would seem that the rank and file of practitioners were leaning toward larger doses of virus. The 2-cc minimum dose has been with us for a long time and is probably still good. I believe that the average weanling pig now receives somewhere between 2 and 3 cc of virus.

#### ADMINISTRATION

The administrative technic can be simmered down to two words: "Be clean." Syringes should be boiled after each day's work. A small quantity of soap chips added to the water will impart a smooth-running finish to the rubber packing when lubricated with glycerin. All syringes and other equipment should be in perfect mechanical condition. Nearly every one now uses some kind of a filling-tube, so that syringes may be

filled without exposing the serum to the dust-laden air usually present where hogs are being handled. All equipment having automatic valves is open to criticism, as they sometimes fail to work.

The seat of injection on pigs that most practitioners use is the axillary space, giving the whole dose under one shoulder or dividing it equally between the right and left, then injecting the virus in the ham. Old sows are generally snubbed up with a rope around the upper jaw and injected behind the ear in the standing position.

#### SERUM ALONE VERSUS SIMULTANEOUS METHOD

It may be sufficient to say that about 98 per cent of the pigs vaccinated at weaning time receive both serum and virus. It is only when there is a serious contraindication present that virus is not used.

#### AFTER-CARE

Feed, in herds that are receiving a fairly well-balanced ration, in both quantity and quality, and are making part of their living on clover or alfalfa pasture, should be continued without change. Green leguminous forage with plenty of outdoor exercise is the best we can hope to obtain for the recently vaccinated herd.

No stock powder or mineralized stock powders containing salt should be allowed for two weeks following vaccination. In herds where the concentrate ration is faulty, it should be corrected to include outdoor exercise and green forage.

#### POST-VACCINATION TROUBLES

These are generally of two kinds. One occurring from seven to nine days after vaccination is generally known as a serum break and carried with it the idea that the serum did not have sufficient antibodies to hold the action of the virus in check, or that the hog was possessed of a hypersensitivity to virus or was affected with a condition that made his resistance low. A liberal dose of serum seems to be the best prophylactic against the occurrence of this condition. In this connection, let me quote from the November issue of the *North American Veterinarian*, saying, "Competing with cheap hog vaccination and reducing the doses of serum and virus is the greatest sin that the corn belt veterinarian may commit. DO NOT DO IT." It has been said again and again by the best of authorities that cutting down the dose of serum and virus and underestimation of the weight of

the hog are responsible for more post-vaccination trouble than all the others put together.

Then we have cholera showing in the herd at from four to eight weeks after vaccination. This has generally been referred to as a virus break, to indicate that the virus had not imparted a solid and lasting immunity. Various causes have been assigned to this condition.

It is said that certain other disease conditions like necrotic enteritis will break down an established immunity. This of course will need further confirmation. The practitioner believes, however, that when he fails to establish a lasting immunity, the virus he used lacked the proper virulency and in a great majority of the cases this deterioration is the result of improper handling, such as exposure to high temperatures after it leaves the hands of the producer. It is generally felt by both users and producers of serum that the fellow who uses small doses of virus has more of this type of trouble than the man who uses a liberal dose and, as I have pointed out before, there is a leaning toward using larger doses of virus.

#### DISCUSSION

DR. A. T. KINSLEY: First and foremost, I agree with the doctor in the main on the statements that he has made. One thing I would particularly stress is that he made a plea for uniform methods of vaccination, which is important. However, as he also stated, it is of greater importance to consider the hog itself when going to a farm to conduct immunization. In other words, the hog is a more important factor than either the serum or the virus or the operator.

Although there has been much published concerning baby-pig vaccination, you will note that Dr. Hell has selected the safe procedure, that is, vaccinate pigs after weaning. Perhaps baby-pig vaccination may be later perfected so that it will be useful in the field.

The dosage of serum as indicated by the essayist is also important. I think it is particularly important, as brought out both by Dr. Hell and Dr. McBryde, that ample dosage should be given, particularly where there is any indication of infection either of cholera or any other condition.

Just a word on the post-vaccination losses. I prefer to discuss them under that title rather than "serum breaks" and "virus breaks." Dr. Hell, in a nice and clean-cut way, described what a serum break is and what a virus break is, but there are certain post-vaccination losses that are causing concern to many practitioners at the present time.

From past experience it has been learned that hogs can be immunized against cholera, provided the hog is of the proper age and is healthy at the time of vaccination; and provided further, that the serum is potent, the virus is virulent and is given in ample dosage; and provided still further that the operation is properly done, and finally, that the hogs have proper after-care.

We have also learned, or I believe we have, that immunity produced by serum and virus is a relative condition, although it is positive in perhaps ninety-eight per cent of hogs that have been properly immunized. There is an occasional case where the immunity is apparently overcome, a very small percentage. So I say that immunity produced by serum and virus is a relative condition, not absolute.



Finally, we have all found that hogs do die after they have been vaccinated. Why shouldn't they? There are numerous diseases of hogs that are fatal in many instances, and it is nothing unusual that a hog should die after it has been vaccinated.

What are the causes of these post-vaccination losses other than serum breaks and virus breaks? First, I would say we should investigate the age of the pigs at the time of immunization; second, their health. There are many so-called breaks that occur from eight to fifteen days after vaccination that are not true serum breaks, but there are losses of hogs, because those hogs were infected with some other disease at the time they were vaccinated. This particularly refers to enteric disorders.

Gentlemen, I believe that you are going to find there are probably three distinct types of enteric disorders that will cause these losses of hogs from eight to fifteen days, or even later, after vaccination, namely, the infectious necrotic enteritis, the dysentery described by the investigators in Indiana, and, third, a type of swine erysipelas, at least a condition from which the erysipelas organism can be isolated and the disease reproduced.

As I say, these losses are usually due, at that time after vaccination, to some other disease. Aside from these, I am still old-fashioned enough to believe there are occasional losses in hogs, that are recently vaccinated, from hemorrhagic septicemia. There are some losses from flu. If you vaccinate a herd of hogs, and they are subjected to an attack of flu within two or three days, you may have very serious losses, where, if the flu had not affected those swine, the losses would have been nil.

Edema of the lung is another condition that is coming up, resulting in perhaps the most severe type of thumps. That is another factor that is entering into the loss of pigs after vaccination. Finally, and perhaps more important than some of these, is infection with parasites.

### **SOUTHERN KANSAS VETERINARY MEDICAL SOCIETY**

At the annual meeting of the Southern Kansas Veterinary Medical Society, held in December, at the Hotel Lassen, Wichita, Kans., the following officers were elected for the coming year: President, Dr. L. E. Bruncher, Mulvane; vice-president, Dr. L. A. Hammers, Clearwater; secretary, Dr. L. E. Dietrich, Wichita; treasurer, Dr. Geo. Rathman, Wichita.

This little organization was formed one year ago and at the completion of the first year is healthy and going strong.

L. E. DIETRICH, *Secretary.*

### **PENNSYLVANIA CONFERENCE OF VETERINARIANS**

An advance copy of the program being arranged for the Conference of Veterinarians, to be held at the University of Pennsylvania School of Veterinary Medicine, January 9-10, indicates that the committee in charge will have something very interesting for every veterinarian who attends. Parasitic diseases of sheep and swine will occupy one session. Therapeutics, surgery, diseases of poultry and canine distemper will have conspicuous places on the program. Dr. Reuben Hilty, of Toledo, Ohio, ex-president of the A. V. M. A., will address the Conference on "How to Obtain a Profitable Private Practice and Conduct It Efficiently."

## THE CONTROL OF RABIES IN INDIANA\*

*By F. H. BROWN, Indianapolis, Ind.*

*State Veterinarian*

When I received an invitation from the chairman of the Section on Sanitary Science and Food Hygiene, to present a paper on "The Control of Rabies in Indiana," I was unable to determine whether it was his intention to perpetrate a huge joke on this convention, or whether he was really in earnest. The fact is, we have not controlled rabies in Indiana and, realizing that an open confession is good for the soul, I must confess frankly that we have not yet made a respectable start in that direction, as the following figures, compiled by our State Board of Health, will show.

In 1918, the positive cases of rabies, diagnosed by the Indiana State Board of Health, numbered only 46, with a steady increase year by year, until 1927, when the positive cases numbered 666. In 1918, only 69 persons were treated on account of having been exposed to the disease, while in 1927, 1,042 were subjected to treatment. In 1918, the cost to the people of the State was \$5,874.27, while, in 1927, the cost had mounted to \$18,752.60. The totals for the period 1918 to 1927, inclusive, show 1,630 positive cases and 1,798 persons treated, at a total cost to the tax-paying public of \$76,366.93, which must be considered as a matter of small import, when we find that, during the period referred to, eight people died from the disease.

From January 1 to June 30, 1928, 523 brains from suspected animals were examined in the State laboratory, resulting in 264 cases of rabies being found, while three were regarded as suspicious. During that period 420 patients were treated, at an approximate expense to the State of \$9,324.55 and the death of one person was recorded.

In this computation, we have given no consideration to the financial loss sustained by the people of Indiana, through the death of live stock on account of having come into contact with rabid dogs. While the law compels any person holding knowledge of, or suspecting, a dangerous, contagious or infectious disease to exist among live stock, to report the same to the State Veterinarian, some people strive to evade the provisions of a state

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

quarantine, consequently, we believe many cases of rabies in domestic animals in the past have not been reported, and so no definite information is available as to the exact amount of this loss, but we feel justified in saying that, during the past ten years, the loss in this direction would amount to many thousands of dollars.

Nor have we taken into consideration the multiplied thousands of dollars that have been spent by those financially able to pay the expense of prophylactic treatment by their family physicians.

#### STRAY DOGS AND MAUDLIN SENTIMENT

It is admitted, upon every hand, that one of the outstanding causes of all this financial loss and all the sorrow that has been brought into the homes and all the anxiety caused by exposure to rabies, is the stray and homeless dog. The immediate and certain destruction of this menace to our live stock industry, as well as to society, is one of the first steps and, I believe, the most important step to be considered in the control of rabies. I have not the slightest doubt that maudlin sentiment over the stray dog has been the direct cause of heavy financial losses, as well as much suffering among mankind.

Much more could be said on this phase of the subject, but I think these data will be sufficient to bear out my statement that we have not yet started to control rabies in Indiana and, furthermore, we shall not be able to make much headway in that direction until we have adopted a more definite system of education.

I base this statement on the fact that when the 1927 legislature attempted to enact a law to compel the vaccination of all dogs in Indiana, we found the law opposed by not only the owner of the lowly hound dog in the woods, but also by the owner of the highbrow canine in the city and particularly, in many instances, by the society woman who, apparently, was willing to gamble with the life of her child, but refused to take a chance on having her pet poodle injured to an irreparable degree with a hypodermic needle.

That education is to be a prime factor in the control of rabies would appear to be obvious, when we consider the statement made by a prominent writer to the effect that countries like England, Australia and New Zealand have no rabies. He proceeds to point out that these countries are islands and that quarantines are more easily maintained there. He gives out the unmistakable

impression that the absence of the disease is due more to a higher degree of education on the subject than to the maintenance of quarantine.

I am not yet ready to admit that the people of the countries just mentioned are more intelligent than the people of this country, but I insist that, in order to bring rabies under control in America, we shall need, as I have already said, a more definite system of education and a more thorough organization within the states and better cooperation between the various states of the Union.

Because of inadequate laws on the subject, the Live Stock Sanitary Board of Indiana had been able to do little, or nothing, toward the control and eradication of rabies, our efforts being directed simply toward the quarantining of farms where the disease was known to exist, or where we had reason to believe animals had been exposed, leaving the matter of dog quarantine to the State, county and municipal health officers.

#### LEGAL AUTHORITY GRANTED

The 1927 Legislature enacted a law which provides that:

The State Veterinarian shall have the power to order and enforce the restraint, muzzling or such other efficient preventive or prophylactic measures as may be deemed necessary by the State Veterinarian to prohibit the spread of rabies of or among all dogs in a locality where a case of rabies has occurred, the extent of the locality and the duration of the restraint, muzzling or other measures to be determined by him. Such other measures, when ordered, shall be at the expense of the owner of such dog, and if the owner shall fail or refuse to comply with the order of the State Veterinarian, it shall be the duty of the police officers, sheriffs, constables and marshals to kill any dog, the owner of which has failed or refused to comply with the order of the State Veterinarian. Any such officer who shall fail, refuse or neglect to carry out the provisions of this act shall be guilty of a misdemeanor and upon conviction thereof shall be fined in any sum not less than one dollar and not more than ten dollars.

If this law is to be enforced, we shall need, and must have, the cooperation of city, county and State public health officials and peace officers.

I am glad to say that, in a majority of instances, we have had the cooperation of health officers, but it is a regrettable fact that, with the exception of a few instances, the peace officers of cities and towns in Indiana have not measured up to the standard set for them by the law-making body.

As you, no doubt, have noted, the law empowers the State Veterinarian to enforce the restraint, muzzling and such other preventive or prophylactic measures as may be deemed necessary for the control of the disease, but it should be obvious that, if

we undertake to enforce this law, we shall be compelled to depend on the peace officers of the various counties and municipalities, as the State Veterinarian will be unable to maintain a sufficient force of assistants to enforce the law throughout the entire state.

It is believed, in fact admitted, that the effectual muzzling of all dogs, as is provided by our State law, would control any outbreak of rabies that might occur. If the local peace officer fails, or refuses to do his duty and destroy all unmuzzled dogs, then he is defeating the purpose of the law. If our law is not to become a dead letter, then the peace officer must do his duty and destroy all unmuzzled dogs at large without fear or favor.

You may have noted, also, that the law empowers the State Veterinarian to cause all dogs to be confined on the premises of the owner and if a dog is found at large during any hour of the day or night, within the quarantined area, any peace officer may destroy him and such peace officer will be protected by the law.

I think I realize that this law will be difficult of enforcement, but as one of the officials charged with its enforcement, I shall expect to make definite progress in the control of the disease, particularly so, if I can have the cooperation of other officials whose responsibilities in the premises are as great as are mine.

#### VACCINATION RECOMMENDED

We advise, and recommend, the use of anti-rabic vaccine on all dogs in localities where an outbreak of the disease has occurred and we not only recommend, but we insist on the immediate destruction, or vaccination and ninety-day quarantine, of definitely exposed dogs. All homeless, unclaimed, or stray dogs must be destroyed, as we recognize this individual as the prime factor in the spread of this most dangerous malady. Animals other than dogs may transmit the virus of rabies to their associates, but without the intervention of the dog, particularly the stray dog, we believe the disease would die out in a few months.

If, and when, the dog-owner is convinced that the vaccination of dogs is a meritorious prophylactic measure and not a mere scheme to enrich the veterinarian, an important advance toward the control of rabies will have been made.

Again, permit me to repeat, that rabies has caused financial loss to the tax-payers and live stock owners of Indiana, totalling many thousands of dollars. This loss has been particularly heavy in the last three years. Aside from this, we must consider



the nine people who have lost their lives from this disease and who stand as martyrs to the cause of public education in the provisions of disease control. Strange as it may seem, human lives apparently must be lost before public sentiment can be obtained and placed behind a worthwhile movement toward disease control.

Personally, I hope that the people of Indiana have suffered sufficient loss of life, mental anguish, fear and financial loss, that they will show little sympathy in the future for the tramp dog and pay little or no attention to the dismal wail of cranks who put the life of a dog above human life and public welfare, and when this point in the education of the people has been reached, they will join hands with the law-enforcing body in the control and eradication of rabies and thus the ultimate goal of eradication may be reached.

#### **NORTHEASTERN PENNSYLVANIA VETERINARY CLUB**

A meeting of the Northeastern Pennsylvania Veterinary Club was held on November 14, 1928, in the Hotel Terminal, Wilkes-Barre, Pa., and was one of the best in point of attendance and interest in subjects presented.

After a brief business session, the members enjoyed a chicken dinner, after which the meeting was called to order by Dr. James W. Hogg, of Wilkes-Barre. The first speaker was Dr. H. R. Church, Deputy State Veterinarian, who reported on the Pennsylvania State Veterinary Medical Association meeting held recently at Harrisburg.

Dr. Louis A. Klein, dean of the Veterinary School, University of Pennsylvania, gave a very interesting talk on "The Abortion Bacillus (Bang) and Its Relation to Public Health." This subject was especially well prepared and delivered in a very pleasing manner. Prevalence of Malta fever of man is attributed by some authorities in this country to Bang bacillus infection of cattle. Dr. Klein answered many questions in a general discussion which followed his talk.

Dr. M. F. Barnes, of the Pennsylvania Bureau of Animal Industry, Harrisburg, talked on "The Abortion Bacillus and Its Relation to the Dairyman." Discussion of this paper was extremely interesting, indicating the widespread interest in this disease, which is of more economic importance to the farmer than tuberculosis. A rising vote of thanks was extended to the speakers and adjournment followed.

THOS. D. JAMES, *Secretary*



## RABIES CONTROL IN MICHIGAN\*

By B. J. KILLHAM, *Lansing, Mich.*

*State Veterinarian*

In view of the widespread prevalence of rabies in Michigan and the evidence of progress on the part of the disease, it might be more appropriate to change the assigned title of this paper to "Efforts to Control Rabies in Michigan."

We know that much has been done to check the spread of rabies in our State and we are continuing our efforts without abatement, believing that ultimately, the results will be obvious and lasting, but the human factor is extremely difficult to govern and anticipate at times, and the independent attitude of the average citizen, coupled with his objection to restraint, and the sentiment involved insofar as his dog is concerned, makes the task extremely difficult and trying, if not exasperating.

### PREVALENCE

With few exceptions, the rabies in Michigan has been confined to the southern part of the State. The reason for this is obvious. That part of the State is most densely populated and is almost in the direct line of traffic between Chicago and Detroit, two large cities in which rabies has recently been very prevalent. In fact, a study of the map showing the infected territory clearly indicates that rabies has advanced in fan-like formations from both of these cities. We greatly fear, however, that the movement of resorters and tourists to northern parts of the State during the summer months will result in the appearance of rabies in new localities.

In examining the records of our Bureau of Animal Industry for the past six years, it is noted that rabies has developed from nothing to a widespread, ever-present menace. The report for 1922 makes no reference to rabies whatever. In 1923, the disease was just casually mentioned. The following year, 124 rabid dogs were located and 18 townships and one county were placed under quarantine. From 1925 to 1927 there was a slight decline in the incidence of rabies, but during the first six months of the present year more rabies was encountered outside of the city of Detroit than had previously been reported for the State at large

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association; Minneapolis, Minn., August 7-10, 1928.

since the beginning of its history. Since January 1, 1928, 37 county dog quarantines have been placed. Some of these were renewals, but 27 different counties were involved. A county quarantine is not placed unless it is demonstrated that proven rabid dogs have been at large in the county and have bitten animals or persons.

#### DOG LAW AND QUARANTINES

Michigan has a good dog law. Some phases of the act might be criticized after close scrutiny, but in the main it is excellent and, in conjunction with certain powers granted to the Commissioner of Agriculture by another act, is entirely adequate for the control of any rabies situation that might arise, provided the restrictions prescribed are properly enforced. But therein lies the crux of the entire situation. Proper enforcement involves the dog-owner as well as the person in the official position and there must be at least a measure of cooperation between these two if the results desired are attained. In some European countries it might be possible to proceed in a dogmatic manner and control or eradicate rabies despite the indifference, opinions or resistance of the citizens, but in this great land of the free such tactics, or the perpetrators thereof, could not long survive.

The section of the statute governing dog quarantines states:

Said commissioner shall have the power to declare and enforce a quarantine on dogs in any district of the State in which there is an outbreak of rabies, hog cholera, foot-and-mouth disease, or any other contagious or infectious disease among live stock; and may order that all dogs in such district shall be securely chained or otherwise confined. Any dog found at large in contravention of the terms of such quarantine or order may be killed. It shall be the duty of the sheriff of each county in the district affected and of his deputies, constables and other municipal police officers to see to it that such quarantine and orders are enforced. Any officer killing a dog pursuant to the provisions of this act shall not be subject to any liability therefor.

Acting under this authority, it is customary, when rabies has been demonstrated, to place a quarantine for an initial period of ninety days. We no longer confine the quarantine restrictions to townships but use the county as a unit. The earlier quarantines required that all dogs in the territory affected be muzzled, chained or otherwise properly confined on the premises of the owner or keeper. With the advent of the single-injection vaccination and the favorable reports covering the use of this method of treatment, a change was made to provide for vaccination. The usual quarantine clause now reads as follows:

Notice is hereby given that all dogs owned, or kept, in ..... County, State of Michigan, unless properly vaccinated against rabies within one year by a qualified veterinarian and *tagged for ready identification*, shall be securely chained or otherwise properly confined on the premises of their owner or keeper, or if allowed to run at large shall be securely muzzled to prevent the aforesaid dogs from biting any other animals, or persons. All owners or keepers of dogs are hereby prohibited from removing any dog whatsoever from said county during the period of this quarantine, unless the dog has been properly vaccinated against rabies by a qualified veterinarian within one year of, and at least 60 days prior to, the date of removal.

The Department has been criticized for this revision, but to date we have not been convinced that the vaccination as a prophylactic measure is not reasonably effective. It may be argued that scientifically correct data have not been presented to uphold the treatment, but how, may we ask, can an absolute check be made under the average conditions obtaining? We do know that reports of properly vaccinated dogs developing rabies under field conditions are very rare, and in practically every instance of this kind no one can state positively that the animal involved was not inoculated before treatment. Replies to a recent questionnaire submitted to the veterinarians of the State disclosed only one direct statement condemning the treatment and this related to one particular product. The writer stated that no trouble occurred when other products were used.

We are fully convinced that the quarantine carrying the vaccination provision more nearly coincides with the ideas of the average law-abiding dog-owner; it relieves him of the irksome duty of restraining his dog and undoubtedly makes the enforcement of the regulation easier and more complete. There are sound objections to the vaccination plan, of course. The most serious of these relates to the identification of the vaccinated dog, and from the law enforcement official's standpoint this presents a real problem. The tag and certificate help, but in many instances it is extremely difficult, if possible, to determine whether a dog running at large has been vaccinated, and a decision very frequently must be made quickly when drastic action becomes advisable.

A sheriff of one of our counties claimed that his men could not identify dogs running at large. In his opinion the time had been reached when it was necessary to shoot susceptible dogs which were permitted to roam. He stated frankly that he was afraid to issue the drastic order because of the possibility of damage suits on the part of the owners of vaccinated dogs. When asked if he would enforce the quarantine to the letter if the vaccination

clause was eliminated, he said he would—and he did—and what is more important he placed rabies under control in his county. Whether he will be returned as sheriff is another question.

#### COUNTY RESPONSIBILITY

The responsibilities of the individual counties with respect to the collection of the dog tax, payment for damages caused by dogs, and the expense of the Pasteur treatment are factors which indirectly assist the rabies control work in Michigan.

The county is charged with the task of collecting the tax and eliminating the unlicensed dog. Theoretically, at least, this plan should result in a reduction of the number of stray dogs—the kind of animals largely responsible for the spread of rabies.

The county is obligated to reimburse any resident live stock owner for animals killed directly or indirectly by dogs. It has been held that animals killed by rabies infection or destroyed on account of the presence of that disease, are subjects for compensation under this act. In practice this arrangement has resulted in a marked reduction of stray dogs, particularly in counties where large bills for damages have been presented.

A recent law requires the county to pay the expenses of the Pasteur treatment for any legal resident who has been exposed to infection by a dog suspected of being rabid. As yet, not sufficient information has been compiled to show whether this statute will have any material effect upon the control work, but it should.

#### CONTROL EFFORTS

Excluding wild animals in certain localities, the dog may be considered the agent responsible for the propagation of rabies. Hence, fundamental control work should begin with the licensing and registration of dogs. The Department of Agriculture is charged with the general oversight of the enforcement of the dog law and is devoting every effort to induce or compel local county officials to comply with the requirements in this connection.

When the presence of rabies in a county is demonstrated, an official quarantine is drafted; copies are sent to the sheriff and other law-enforcement officials; placards relating to the quarantine are prepared and forwarded to the sheriff with instructions to have them posted in conspicuous places in and about the county immediately; county agents and other persons are requested to give the matter as much publicity as possible; and very frequently personal visits are made to the affected territory

in an effort to arouse interest and stimulate action on the part of local officials. Occasionally it is necessary to suppress an over-zealous official who starts out with a gun as soon as the quarantine is effective. The promiscuous shooting of dogs running at large is not a sound procedure at the start of the campaign and such action very frequently produces decidedly unfavorable reactions. In a few instances it has been necessary to solicit the aid of the State Police in the interest of enforcement because of local political conditions or apathy.

In 1924, an effort was made to have the Detroit City Council pass an ordinance requiring that all dogs must be vaccinated to be licensed. The opposition presented by certain kennel clubs, antivivisectionists and plain cranks was such that a compromise was reached and the ordinance, as finally passed, provided for two kinds of licenses. The unvaccinated dog may be licensed but must be restrained at all times. The licensed, vaccinated dog is not subject to the restraint requirement and is distinguished by a brass license tag. In this connection it might be mentioned that following the inauguration of this system of licensing, Dr. Vaughan, Commissioner of Health for Detroit, compiled some data covering 42,000 dogs which indicate that rabies was more than twenty times as prevalent in unvaccinated dogs as in those animals which had received the prophylactic treatment.

Several months ago the situation in Detroit became so serious that the officers of the Southeastern Michigan Veterinary Medical Association were called into conference. One of the results of this meeting was an arrangement whereby each member of the Association was to spend a half-day in turn at the dog pound for the purpose of vaccinating dogs. The net result of this plan could not be determined, but the veterinarians adhered closely to the agreement and undoubtedly the accomplishments from an educational viewpoint justified the time and efforts expended.

#### EDUCATIONAL WORK

The rabies situation has been thoroughly discussed with members of the State Department of Health and the assistance of that organization obtained. Communications have been sent to all local health officers and city and village officials by the Commissioner of Health in an effort to arouse interest and point out the danger and proper methods of procedure. No opportunity has been lost to give the true situation publicity and we have found the press very willing to assist.



In view of conditions which now exist and will continue to obtain, we believe that some drastic action must be taken to regulate the traffic of dogs in automobiles, if rabies is to be controlled in this country. Despite the regulations which prohibit the removal of unvaccinated dogs from quarantined areas, dogs are leaving those districts every day in automobiles. The common carrier will and does regard and observe the quarantine requirements, but how are we going to check the dog in the automobile? Frankly, in our State we do not have the facilities for such a task. This kind of traffic is enormous. One of the inspectors in a Michigan city located across the river from a Canadian port of entry advises that there is a dog in every fourth car crossing the border and there is no reason to believe that the ratio is less among tourists who do not leave the states.

That dogs conveyed from infected territory in automobiles do become rabid en route, or at the other end of the journey, and set up new centers of infection has been demonstrated to our entire satisfaction. Rabid dogs have appeared sixty miles and more from infected territory and have mutilated animals in an almost unbelievable manner. We have an authentic record of a rabid dog propelling himself sixty miles, but at the end of the journey he was in no condition to engage in successful combat with a large number of animals. The automobile offered the only logical transportation solution in the former case. Efforts have been made to interest automobile clubs or associations and other organizations in this phase of the problem and this work will be continued, but the control of this great avenue of infection still lies with the dog-owner. Can he be whipped into line or will it be necessary, if feasible, to patrol the highways or establish quarantine stations on all roads leading out of quarantined districts.

#### OBSTACLES

It is very probable that any rabies control campaign, involving the dog as it does, will be confronted by all the obstacles presented by perverse members of the human family in other disease control projects, plus interference attributable to sentimental attachment to man's best friend.

Kennel clubs and so-called humane enthusiasts have offered objections to vaccination and quarantine for reasons not entirely obvious. Cranks who can orate for hours in behalf of the dog, but who are apparently unconscious of the rights and privileges



of the child, are all too numerous. Physicians and veterinarians are not entirely blameless. We were recently advised by a prominent health official of the State that a classmate had very recently, and in all seriousness, asked him if there was really anything to the contention that dogs were actually spreading rabies and endangering human beings. A few veterinarians, probably through carelessness, have interfered greatly by not properly vaccinating dogs. In some instances when the treatment apparently was properly applied, certificates were not issued or the owners were not advised of the need of tagging.

One veterinarian from another state, for reasons best known to himself, spoke before a prominent kennel club in an effort to neutralize or undermine the work of the local veterinarians and State officials. What this veterinarian actually said at the meeting was not of great consequence because an opportunity was had to send some real authorities to the meeting and they succeeded in making the gentleman look very foolish, but he received an enormous amount of advance publicity which was directly responsible for obstinate interference with control efforts. Imagine, if you can, a veterinarian who poses as an authority on dogs proclaiming to the wide world that there is no such disease as rabies; that the vaccination of dogs represents a gigantic swindle; and contending that a positive report is submitted for every dog's head sent to a state or municipal laboratory for examination.

#### CONCLUSIONS

Briefly summarizing the rabies situation as it applies to Michigan, the following conclusions are presented:

The stray dog should be eliminated, of course, but the human factor and not the dog is the most difficult to govern and anticipate and much work of an educational nature is necessary to neutralize or bring about the control of the demonstrated vagaries.

Rabies in common with many other infectious diseases follows the lines of traffic.

The disease has developed from practically nothing to a condition involving 27 counties—nearly one-third of the State—in six years. Despite a good dog law, city ordinances, rabies quarantines, certain responsibilities for the control of dogs placed upon counties, and average enforcement of the various restrictions,

rabies has spread and is more prevalent than ever before in the history of the State.

There is no proof to indicate that the single-injection vaccination as a prophylactic is not reasonably effective. A vaccination clause makes for easier and more complete quarantine enforcement. The outstanding objection to vaccination relates to the proper identification of treated dogs running at large.

The movement of susceptible dogs in automobiles must be checked if rabies is to be controlled. Data show that approximately twenty-five per cent of the tourists' cars contain dogs. If a dog becomes rabid enroute, it is almost sure to escape or be liberated.

"Dog days" are a delusion. Most of the rabies occurs during the late winter and spring. A seasonal decline is now in evidence.

The chief obstacles to rabies control are presented by perverse and unreasonably sentimental persons, kennel clubs, misguided humane enthusiasts, plain cranks, a very few physicians and veterinarians and some "center of the road" officials.

#### DISCUSSION

DR. ADOLPH EICHHORN: The state officials presenting these excellent papers have certainly expressed themselves quite emphatically as to the possibility of controlling rabies when proper measures are taken. The possibility of eradicating rabies is comparatively simpler than many other diseases which have been successfully eradicated from this country. Pleuro-pneumonia, tuberculosis and foot-and-mouth disease presented much more difficult problems than would be the case in an effort to eradicate rabies.

It is my opinion that the eradication work should be preceded by an educational campaign. Various organizations take an antagonistic attitude towards any drastic measures which are contemplated for the control of the disease and their concerted efforts are usually successful in breaking down any efforts towards active eradication work. When efforts have been made to adopt compulsory vaccination as a means of controlling the disease, organized efforts were made to combat such efforts. During such meetings the existence of rabies was disclaimed and control eradication measures were designated as a scheme of the veterinarians and manufacturers of the vaccine for the purpose of increasing their revenue. Yet, they entirely lose sight of the fact that in the past year approximately 60,000 people had to take the rabies treatment in the United States and from all indications the number of exposed people required to take the treatment is on the increase. I believe there is only one country in the world at the present time that compares with the United States in this respect and that is Russia. If we only consider that with the money spent for the treatment of 60,000 people in one year, if diverted towards the control and eradication of the disease in dogs, in a period of four to five years the disease could be effectively eradicated, especially with the assistance of vaccination and the enforcement of sanitary measures.

As far as the effectiveness of the vaccination is concerned, the papers have fully covered that phase of the subject. The data we now have available on the vaccination should be sufficient to impress everyone that it is a very important and necessary adjunct in any effort of eradicating rabies.

Experimental work conducted by competent investigators has conclusively proven that vaccinated dogs exposed to natural infection have in all instances resisted the infection and, after all, that is the crucial test in determining the effectiveness of the vaccination. The public should be educated to the realiza-

tion of the necessity of the eradication of rabies for public health reasons as well as in the interest of the dog-owner and that unless concerted action is taken very little progress can be made in the control of this disease. With the extension of the disease, the danger to human life will also proportionately increase. The data available show that rabies is on the increase throughout the United States and such condition should not exist in this advanced age of civilization.

**DR. L. E. CASE:** We have no rabies in the island of Hawaii and I agree with Dr. Brown when he says we are not any more intelligent than any other section of the United States, but we have a formal quarantine. We started with a four-months quarantine and were criticised. We changed it to a week. Then we were criticised for not giving proper protection to the Territory, vaccination not considered effective enough, so we went back to our four-months quarantine. We are thinking of increasing it to six months. In England, where they have a six-months quarantine, they have had cases come down in four and one-half months. I would like to get an opinion from these men, who probably know more about rabies than I do, whether they think that four months would be sufficient. Before increasing the period to six months, I will have to have something to show the legislators. Sometimes it is not so easy to make them see these things, especially when we have opposition from the dog-owners. Our Humane Society is very good. We have a great deal of cooperation with our police force.

One instance: A Pekinese dog was brought from China to a local prohibition officer and was placed in quarantine. His wife went after the dog and asked to see it. The lady wished to take the dog home. Another lady wanted to see her dog and the prohibition officer's wife took her dog. A police officer jumped on the running-board of the prohibition officer's car and was ordered off. We took it up with our Governor and then with Washington and the prohibition officer was removed from his position, but I would like to know what you people think about a four-months quarantine or increasing it to six months. I do not believe there is any other place of the size of Hawaii that has as many dogs. We do not seem to be able to get any proper legislation.

**MAJOR R. A. KELSER:** In the Philippine Islands the question of canine vaccination was recently taken up by the insular authorities because of the marked increase in rabies in our islands across the Pacific. In connection with the problem, consideration was given to the possibility of being able to control rabies by the administration of a single injection of vaccine to dogs. Because of the time required to get vaccine from the United States, prepared especially for the single-injection method of immunization, veterinarians were supplied with the type of vaccine prepared locally for human use. This consisted of a diluted vaccine, made after a modification of the Hogyes method, and administered to man in daily doses over a period of three weeks. The results from the administration of single doses of this vaccine to dogs were decidedly unsatisfactory. The question then arose as to whether vaccination with a single injection of this rabies vaccine would constitute immunization of the dog with a "properly prepared vaccine" as provided for in the local ordinance. In some experimental work, which we shortly expect to publish, we have found that within certain limits the value of rabies vaccine in which the virus is killed varies according to the amount of nerve tissue the vaccine contains. I would like to emphasize the point that in passing on the efficacy of rabies vaccine that that feature should be considered. Personally I am not yet ready to admit that the value of rabies vaccine depends upon killed virus. In other words I do not believe that the immunity conferred by these killed-virus vaccines is due to the killed virus, but is probably due to some by-product as a result of the reaction between the nerve tissue and the virus. I think, therefore, that some of the discrepancies in results with various vaccines may be due to variation in the amount of nerve tissue they contain. In order to be effective, it is my opinion that a killed vaccine should contain a relatively large amount of nerve tissue.

**DR. H. K. WRIGHT:** It is also of interest to know that a large number of the rabies treatments given in this country are single-method rabies vaccination. One of the principal objections of people is that they contend that there

is a possibility of the treatment doing harm. You can not introduce rabies, no matter how many treatments are given.

DR. A. H. QUIN, JR.: Some sixty days ago, in the city of Des Moines, we had a very specific case of rabies exposure. A rabid dog, weighing about sixty pounds, passed through my own yard within a few feet of my baby daughter. It had bitten five dogs in one block. The dogs in my block, starting on the third day, were given six treatments. The dogs in the following block, that were bitten, were tied and restrained by order of the Health Official, until he said the dogs were all right and there would be no more danger. On the fifteenth day, they were released. On the eighteenth day, one of the dogs that had been tied bit a child and several dogs. None of the dogs in our block were bitten. There has not been a single case reported where the dog was immunized by one injection. We have had wonderful cooperation from the state officials and the press but the city officials are very ignorant of how rabies should be controlled.

DR. CASE: I read in our files of a developed case of rabies in a Hindu boy thirteen years old, fifteen months after he was infected. I believe the period to insure reasonably safety should not be under one year.

MEMBER: I would like to ask what percentage of animals vaccinated will develop rabies unless nerve tissue is injected.

DR. EICHORN: All vaccine prepared at the present time contains nerve tissue. It is obtained from the central nervous system of an animal killed in the last stages of the disease.

With regard to the proportion of infections which develop following a bite, one cannot definitely state when any bite from an infected animal may become infective. As a matter of fact, any abrasion of the skin may be sufficient to convey the virus to the central nervous system. The fact that quite a proportion of the cases do not develop rabies is not due in all instances to the extent of the bite, as in any instance even the injury of a minute nerve may convey the virus to the brain. The statistical data collected by various investigators established that anywhere from 20 to 40 per cent of animals bitten by rabid dogs develop rabies. These data are based on statistical information covering many thousands of animals.

MEMBER: These papers and the discussion have been brought up entirely from the prophylactic point of rabies and supposedly exposed animals. I believe in communities where the disease has just been introduced there is a different attitude than in communities where there is an epizootic. I have had the experience of being in communities where animals have been presented for vaccination and in fourteen days an animal has developed rabies and exposed certain members of the family. I think in these localities that the local veterinarian should advise the owner of the dog that in order to avoid trouble it is absolutely necessary to keep the dog under quarantine for twenty-one days following vaccination.

### Two Veterinarians Honored

At the annual meeting of the Oklahoma State Public Health Association held recently, two veterinarians were signally honored. Dr. Walter Hyde Martin (Iowa '03), of El Reno, Oklahoma, was elected president and Dr. C. C. Hisel (K. C. V. C. '16), of Oklahoma City, was elected vice-president. Dr. Martin is a practitioner and Dr. Hisel is state veterinarian of Oklahoma. Considering the fact that the organization is made up largely of physicians and others closely identified with tuberculosis work in humans, the election of Drs. Martin and Hisel is not only a personal honor but a tribute to the veterinary profession as a whole.

## CLINICAL MANIFESTATIONS AND SURGICAL TREATMENT OF LEAD POISONING IN THE HORSE\*

*By P. G. MACKINTOSH, Yakima, Wash.*

The writer has been engaged in active practice in an orchard district since the spring of 1916 and during that period has observed the above-mentioned disease from personal contact. Prior to 1916 I was told by many of our clientele that they had lost horses from symptoms similar to those of the orchard hay disease but at that time it was called influenza or forage poisoning. Personally, from close observation and the different illustrations presented to me in practice here, I have called the condition mentioned above arsenate of lead poisoning in its various forms and complications of such poisoning.

In this valley, our cover crop in orchards is alfalfa, all crops depending on irrigation for moisture. Alfalfa is cut from between the trees in orchards three or four times in one season. During the spring and summer months, the orchardist sprays his apple and pear trees from three to five times, depending on how bad the aphus are, with arsenate of lead (strength 10 to 20 pounds to each 150 gallons of water).

We have made a point of observing the orchardist during the process of spraying and can state with certainty that the alfalfa around the trees, also that in the area between the rows of trees, is saturated with arsenate of lead spray. The alfalfa is cut and removed from the orchards for feeding purposes and the process repeated again and again until the season's spraying is finished and the various cuttings of alfalfa taken care of. Knowing that lead is a cumulative metal and that we have little or no rainfall, there is no possible way for the spray to be washed from the alfalfa.

### CLINICAL CASES

Under this head we would like to divide the poisoning into two forms of acute and two forms of chronic.

*First acute:* Where animals consume the arsenate of lead directly from containers, we are frequently called upon to treat such cases as these during the spraying season.

*Second acute:* Where animals pasture on orchard hay during the process of spraying or while the hay is still wet from spraying,

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.



the disease is more prevalent among cows. A mistake formerly made and one which we see occasionally is that of tethering cows in the orchard and not removing them during spraying, consequently many family cows are lost in this way. We are called to cases now where animals have broken their tethers and gotten into freshly sprayed orchards. I might add here that orchard hay freshly sprayed with arsenate of lead is very palatable to both horses and cattle, probably due to its metallic taste.

To illustrate, I might mention a case of this nature to which I was called in the spring of 1916. On arriving at the ranch I found three horses in a half-acre of orchard that had been fenced for the purpose of tying horses out over night. This half-acre was sprayed late in the afternoon with arsenate of lead and the same evening three horses were turned out there for the night. The following morning I was called, found one horse down unable to get up and the other two with partial paralysis, especially of peripheral nervous system, knuckling, etc.

*First chronic:* Cases under this classification are horses that have been fed sprayed orchard hay for a time, the duration of the period before symptoms are noticed depending greatly on whether the horses are being fed hay from an old or a young orchard. Horses that come from a locality where there is open farming (no spray being used) fed on hay from an old orchard go bad in from six to eight months, while horses that begin feeding on hay from a young orchard may go for a period of six years. This is explained by the fact that young orchards do not consume a large amount of spray, the trees being small, whereas the space between trees in an older orchard is covered by foliage and therefore larger amounts of spray are consumed. Consequently the alfalfa beneath the trees becomes saturated with spray.

*Symptoms:* A farmer will call up and say, "Come right out, my horse is choking, or my horse is having a fit." Many times when we arrive on the scene everything is all right and the horse is quiet. But, upon hitching up and trotting the horse half a block or more, he will roar and if not stopped at once will go down as you have seen horses do with laryngeal hemiplegia. We also notice on closer observation a hanging of the lower lip and when the lower lip is caught in the hand and pulled away from the lower incisor teeth, it will not snap back into place like that of a normal horse. Also the lack of use of the panniculus carnosus. I have often taken a fold of the skin in the region of the flank or along the side and run a suturing needle through without the least



response from the subject. Again we have performed tracheotomy without the use of the local anaesthetic. We also see cases of this kind knuckling, if started up suddenly or stringhalt sometimes.

In this chronic condition laryngeal hemiplegia is the predominant symptom. My theory is that animals fed orchard-sprayed hay for any length of time accumulate enough lead to cause this condition. Chemistry taught us that lead is a cumulative drug or metal, also that it has a special affinity for nerve cells. Due to the fact that the left recurrent nerve is one of the weak nerves of the animal body, it seems reasonable to me that it should be one of the first affected, manifested by roaring.

#### TREATMENT

Horses showing laryngeal hemiplegia without peripheral complications are operated upon. We have done both the Williams and McKillip operations, with varied results. We have been doing this since 1916 and there are quite a number of horses which were considered useless at that time, working now.

*Second chronic:* This is most common in the fall and winter seasons. When the orchardist has finished his fruit-picking, he usually turns his stock into the orchard to graze. The length of time before a horse goes *wrong* depends upon each individual case, as to age of orchard, amount of alfalfa left in the orchard and whether or not the horse is entirely dependent upon the orchard for feed. Some orchardists take their horses in at night. feed them and again before turning them out in the morning. The horses that are turned out in an orchard and are not hand-fed are the first to go wrong and this probably occurs when feed is short in the orchard and it is necessary for him to feed from alfalfa around the base of trees and close to the ground. In short, he develops an inflammation of the mucous membrane of the posterior buccal cavity with pharyngeal paralysis. In many of these cases, we have choke with a green discharge from the nostrils, an increase in temperature, tracheitis, mechanical pneumonia and almost always a fatal termination. We lose more horses from this practice of grazing them in orchards during the fall and winter, than any other form of lead poisoning.

*Postmortem:* The writer has performed postmortems on many animals and in the majority of cases lesions were confined to the respiratory tract and this in the form of inflammation.

*Differential diagnosis:* Lathrism, a condition caused by the Indian pea, but as the Indian pea is not present in this vicinity we have not given it consideration.

## DISEASES OF RANGE SHEEP\*

*By E. T. BAKER, Moscow, Idaho*

In the West the common unit is a "band" of sheep, consisting of from 1500 to 2000 ewes. The average annual increase is from 100 to 140 per cent, with the sexes running about even. The loss per year ranges from 5 to 10 per cent, depending, of course, greatly upon the season.

The chief causes of loss on the range are:

1. Predatory animals—particularly the coyote.
2. Poisonous plants—usually in the spring.
3. Weather conditions, such as a late blizzard, or a sudden cold rain just after shearing.
4. Parasites—both external and internal.
5. Sporadic diseases, either of a contagious or non-infectious nature, and often assuming the epizootic form, as in foot-rot, or the paralysis of pregnancy.

As the country grows older and becomes more settled, the raising of sheep becomes more complicated. Summer range is a problem, and different diseases appear. A generation ago, range was free; the hostile cattleman and bad weather constituted the only real menace to the sheepman. Then came scabies; next, foot-rot; until now we have a large assortment of various maladies.

The sheep industry, also, rises and falls with political conditions and world-wide economic factors. This year the sheepman will make money, with ewes around \$15 a head; wool, 35 cents a pound; lambs bringing \$10 to \$12 in midsummer, and abundant range. Next year, some unforeseen thing may come along and he will go broke, unless strongly entrenched, financially.

To be of service to his sheep-owning clients, the veterinarian of today should know:

First, a history of sheep; their different breeds and how to distinguish them.

Second, a general knowledge of the physiology, hygiene and handling of sheep.

Third, the ability to diagnose the various pathological conditions commonly found in sheep.

By constant study and experience, one can often make a pretty good diagnosis from the general symptoms, time of year

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

and where found. Thus we expect foot-rot in wet weather; tetanus following castration or docking; pregnancy diseases in early winter; plant poisoning in early spring; blackleg in lambs in early summer, and so on. Each disease unfolds itself as clearly as a case of azoturia, if we can read the symptoms correctly.

However, do not make a snap diagnosis. Always leave a loophole behind you, to crawl out if necessary. The writer uses the word "probably" quite often. Take samples for bacteriological examination whenever necessary. If you are not able to make a reasonably sure diagnosis, tell your client; he will respect your honesty.

Charge a good fee for your work, and it will be more appreciated than when you toil for almost nothing.

On the range, perhaps a dozen major ailments occupy our attention, although the various parts of the country have totally different maladies. We find the low coastal region suffering from internal parasites, and the high mountain territory more subject to obscure diseases. The following diseases are met with in a range practice:

1. *Foot-rot*: There are two types. The first, or genuine lip-and-leg ulceration, caused by the *Bacillus necrophorus*, which attacks the mouth, genitals and skin as well as the feet. The second, or common foot-rot or canker, caused chiefly by the *Staphylococcus albus*, resembling thrush in the horse. The treatment depends on the number affected, and type of trouble. Severe trimming of affected hoof and tissue necessary. One can use the arsenic dip; 4 per cent solution of potassium permanganate; 5 per cent solution of blue vitriol; coal-tar dip, one to forty; or anything else available. A penetrating oil, such as a light mineral oil, forty parts, to liquor cresolis compositus, one part, is often good, and for dressing individually the well-trimmed foot, any ointment composed of cresol, tar, sulphur, carbolic acid, oil of cade, camphor, and made up with lard and petrolatum is very healing. After doctoring one outbreak of this you will lose a lot of optimism.

2. *Dead lambs*: This can be caused by anything from crowding to spoiled food, lack of balanced ration, or assume a regular outbreak.

3. *Maggots*: A constant menace to the sheepman. Two ounces of lysol in enough coal-oil to make a pint will solve this question.

4. *Ticks*: Dipping. With spotted fever occurring in various parts of the West, tularemia is assuming more importance.

5. *Lambing troubles*: Mostly eversion of the uterus, metritis, and mammitis (commonly called "blue bag" by the sheepman).

6. *Paralysis of pregnancy*: Whether this is due to acidosis, lack of exercise, malnutrition, impaction, auto-intoxication or something else, only God knows, and so far as the writer knows, no divine revelations have been given yet.

7. *Stiff lambs*: Another puzzle, and so also is "big head," occurring in lambs in certain localities.

8. *Goiter*: Prevalent in various parts of the West.

9. *Tetanus*: Occurring in infected lambing corrals.

10. *Rabies*: Very seldom seen in sheep, but fairly common in the shepherd dogs.

11. *Pneumonia*: Assumes various forms, which can be classed under the same head as hemorrhagic septicemia or shipping fever. When used in time, the bacterins have given good results to the writer.

12. *Parasites*: Lung worms, stomach worms and flukes. Pseudo-tuberculosis is common in various parts of the range country.

We have not mentioned the various plant poisonings for they are of a wide variety. We find woody aster in Wyoming; greasewood in Colorado; rubber weed in New Mexico; Johnson grass in California; lupine in Oregon; death camas in Washington; loco in Idaho; while reports of mineral poisonings have come from Montana, Utah and Nevada.

Digestive disturbances, such as diarrhea in lambs, impaction in ewes, kidney or bladder troubles in wethers and bucks, are always present. In the great majority of cases, the animal dies getting well.

There are numerous other diseases and ailments continually arising, and time prevents further discussion, but the above will give some idea of what the veterinarian, whose practice takes in range sheep work, is up against.

---

### How Long?

"When will the public rise up," asks a New York newspaper editorial, "and decline to live in a city where one breathes gasoline-tainted air all day?" We dunno, but the lung-suffering public may rebel any minute now.

—*Farm & Fireside*

## PREVENTION AND CONTROL OF SHEEP PARASITES IN PENNSYLVANIA\*

By HENRY W. TURNER and JOSEPH G. MOON

*Pennsylvania Bureau of Animal Industry, Harrisburg, Pa.*

In 1920 a survey was made to ascertain the prevalence of parasites in sheep in Pennsylvania. For this purpose questionnaires were sent to the sheep-owners together with containers in which composite samples of feces from the respective flocks were to be collected and forwarded to the laboratory. These samples of feces were examined microscopically, to determine the presence of parasite eggs and larvae.

From the answers contained in the questionnaires it was learned that by far the greatest number of deaths in sheep was caused by parasitic infestations and that those flocks having access to lowland or swampy pasture were experiencing the largest mortality.

With these data at hand the Pennsylvania Bureau of Animal Industry inaugurated, in October, 1925, a series of experiments on sheep and lambs at its laboratory farm, at Harrisburg. Primarily, the object was to learn if it is possible to rear a flock of lambs on contaminated ground and, by the periodical use of an anthelmintic, to keep them reasonably free of internal parasites.

The procedure adopted was as follows: A flock of Merino sheep was purchased, consisting of forty-eight ewes and one ram. The examination of a composite sample of feces revealed the presence of nematode eggs. After being turned on the pasture selected, feces was collected from the animals individually, in wide-mouthed bottles of four-ounce capacity. These samples were collected at intervals of three to four weeks. The actual bulk of the feces collected in each case varied from one to four ounces. It probably averaged some three ounces by volume.

The material was broken up in a mortar and passed through a series of sieves, ranging from 20 to 80 meshes per inch. It was then placed in tall jars to sediment, the time allowed never being less than two hours. After sedimentation it was examined microscopically.

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.



During the first year the ewes were bred but were not given any treatment, as it was desired to have the pasture contaminated with the nematode eggs. The lambs were born in April and May of 1926 and were housed with the ewes until June, at which time both were turned on the same pasture.

Fecal examinations of the sheep showed varying degrees of infestation. Average infestation showed a gradual increase during the warm months reaching the peak from May to August and then gradually declining. This increase was evidenced both in

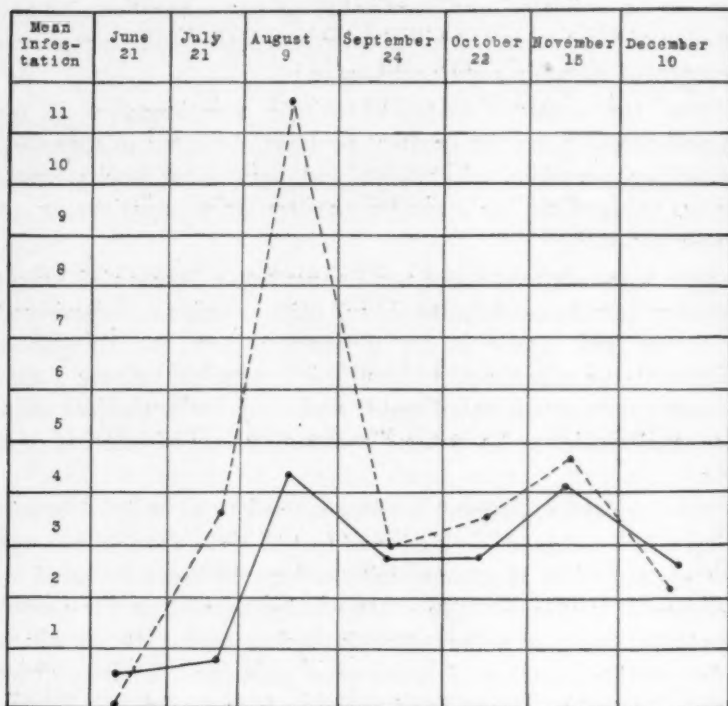


CHART 1. Graph showing degree of parasitic infestation of sheep at different periods.

the treated and untreated sheep and lambs. In the treated groups, however, the peak was not so high as in the untreated group. (See chart 1.)

On June 21, 1926, the first fecal examination of the 38 lambs was made, of which fourteen were positive. The 38 lambs were then divided into two groups. Nine of the fourteen positive lambs were included in group 1 and the five other positive lambs were placed in group 2.



Group 1, numbering 21 lambs, received the 1 per cent copper sulphate treatment, as recommended by Hutcheon, in amounts proportionate to their body weight, i. e., 1 cc of a 1 per cent copper sulphate solution for each pound of body weight. Group 2, consisting of seventeen lambs, did not receive any treatment.

Group 1 received the copper sulphate treatment from July 14, 1926, every three to four weeks, until January, 1927. Fecal examinations also were made of each individual of both groups, at three-week intervals, until January, 1928. All the lambs, 38 in number, both treated and untreated, showed at one time or another the presence of nematode eggs in the feces.

From the postmortem results upon these lambs, namely, the negative findings in the majority of cases of stomach worms, it was thought that the copper sulphate treatment was of value in ridding sheep of stomach worms. However, 97 per cent showed infestations with various intestinal worms such as: *Nematodirus filicollis*, *Bunostomum trigonocephalum*, *Cooperia curticei*, *Trichostrongylus vitrinus*, *Oesophagostomum columbianum*, *Trichuris ovis* and *Chabertia ovina*. It was therefore decided to repeat the experiment the next year and include, as anthelmintics, tetrachlorethylene and Lugol's solution, as well as the copper sulphate.

As a result of the 1926 experiment we learned that it was safe to treat lambs of the fine wool breeds that weigh 30 to 35 pounds; in one case treatment was administered to a lamb weighing only 23 pounds. In no case were there any deaths as the results of the treatments.

The average age at which lambs received the initial treatment was 66 days, although three were treated at the age of 46, 49 and 50 days, respectively. In this work the average age of infestation, based on the microscopical examinations of the feces, was 4 months and 12 days; the shortest interval in 1926 was 39 days and in 1927, 35 days, while the longest interval from birth to date of infestation was 199 days.

All the lambs, except three, used in the 1927 experiment, were born in April, 1927. There were forty in number and were raised in contaminated sheds and pastures, being allowed to associate with the ewes at all times. These forty lambs were divided into four groups of ten each. Group 1 was given the 1 per cent copper sulphate treatment; group 2, Lugol's solution; group 3, tetrachlorethylene; and group 4 was used as controls.

Treatment was started July 6, 1927, and was repeated every three to four weeks until January 26, 1928. Fecal examinations were made of all the lambs, May 26, 1927, and these examinations also were continued until January 26, 1928, at three-to-four-week intervals. By November 10, 1927, all the lambs showed the presence of nematode eggs in the feces.

The copper sulphate treatment given to group 1 was the same as outlined in the 1926 experiment. The Lugol's solution administered to group 2 was prepared by adding one-half ounce of Lugol's solution to one quart of water, as recommended by George H. Lamson, Jr. The dose was 1 cc per pound of body weight. The tetrachlorethylene was administered in 1-cc capsules and the dosage also was governed by the body weight, e. g., 1 cc for each ten pounds of body weight.

It might be well to mention at this time that the lambs in both these experiments were weighed prior to dosing.

Twenty of the forty lambs were killed February 14, 1928, and the other twenty, February 22, 1928. Feces were collected also from the rectum of each lamb at time of postmortem and examined microscopically in order to see how it would check with the postmortem findings. The postmortem examination of the first twenty lambs showed that all had a moderate infestation of parasites. As there were twenty lambs remaining, it was decided to treat these once more before slaughter.

On February 17, 1928, five days prior to the time of slaughter, each lamb was given the respective treatment that it had been receiving throughout this experiment and all were killed, February 22, 1928.

Five of these twenty lambs had been given the copper sulphate treatment and on postmortem all five showed stomach, intestinal and lung worms. Five more had been included in the Lugol's solution group. All of these five showed stomach and intestinal worms, while three of them showed only lung worms. The third group of four lambs had been given tetrachlorethylene. Three of the four showed stomach and lung worms. All four showed intestinal worms. All of the control group, six in number, showed stomach and intestinal worms; four of these six showed lung worms.

The postmortem findings of the four groups of lambs may be found in table I. However, it might be well to mention that of these forty lambs, 100 per cent showed nodular worms, 95 per

cent stomach worms and 82.5 per cent lung worms. These infestations varied from mild to moderate and in a few cases heavy.

These data show that our principal sheep parasitic problems in Pennsylvania are the stomach worm, nodular worm and lung worm. Perhaps copper sulphate, Lugol's solution, tetrachlorethylene or some other drug will control the stomach worm (*Haemonchus contortus*) even though we were unable to eradicate it, but what are we going to do with the infestations of the nodular worm (*Oesophagostomum columbianum*) and the lung worm (*Dictyocaulus filaris*)?

This year we are working on an entirely different line, that of prevention, and we are trying, by a modification of the Dalrymple

TABLE I—*Postmortem findings of the four groups*

| TREATMENT            | NUMBER OF SHEEP | AVERAGE PARASITIC INFESTATION (%) |            |               |               | RESULTS OF EXAMINATIONS OF FECES COLLECTED POSTMORTEM |          |
|----------------------|-----------------|-----------------------------------|------------|---------------|---------------|---|----------|
|                      |                 | GRUP                              | LUNG WORMS | STOMACH WORMS | NODULAR WORMS | POSITIVE  | NEGATIVE |
|                      |                 |                                   |            |               |               |   |          |
| 1 Copper Sulphate    | 10              | 10                                | 100        | 90            | 100           | 8   | 2        |
| 2 Lugol's Solution   | 10              | 20                                | 80         | 100           | 100           | 10  | 0        |
| 3 Tetrachlorethylene | 10              | 60                                | 70         | 90            | 100           | 9   | 1        |
| 4 Controls           | 10              | 10                                | 80         | 100           | 100           | 10  | 0        |

bare-lot method, and the Ransom nursing method to raise our lambs free of parasites. We are collecting feces from those lambs at two-week intervals and examining them microscopically.

#### SUMMARY

The average age of infestation of lambs raised on contaminated pastures was 4 months and 12 days. Lambs 66 days old and weighing 30 to 35 pounds may be safely treated.

Fecal examinations to detect the presence of parasite eggs show a gradual increase in the number of eggs found during the warm months from May to August and then gradually decline.

While copper sulphate, Lugol's solution and tetrachlorethylene may control stomach worms it does not appear from this work that it will eradicate them. Furthermore, these drugs do not

appear to have any marked anthelmintic value that would warrant their use in flocks infested with nodular disease or lung worms.

In conclusion we wish to give Mr. Howard Crawley, who was formerly the parasitologist for the Pennsylvania Bureau of Animal Industry, credit for his assistance in connection with this work.

---

### Every Kick's a Boost

*By PADDY*

Folks say a "hoss" has a lot of sense,  
Is blessed with near human intelligence,  
While a mule is mean and very dense,  
With no good traits to recompense.

Ask the man that knows 'em both,  
Knows 'em through and through,  
He will be a man that loves a "hoss"  
But he will love the old mule too.

He certainly would not you advise  
On dress parade a mule to ride,  
But he would tell you with quite honest pride  
A mule beats a "hoss" most any old time.

No mule is cursed by the deadly sin Greed,  
Though mangers be kept full up of feed,  
But fill a manger for a "hoss,"  
He will foolishly try to eat the lot.

Compare the two in a "tight place."  
The mule will be quiet and it easy take,  
While a "hoss" shows fear and fidgets instead  
And fidgety "hoss" leads to trouble ahead.

Take 'em again on a runaway jaunt  
In both, too, runaway is a common fault,  
But never fear the mule will fail to stop  
Before he hurts himself, but will a "hoss"?

Ask the man that know 'em both,  
Knows 'em through and through,  
He'll say that on an intelligence test  
Old much abused mule will come off best.

## HOOKWORM INFESTATION IN DOGS (UNCINARIASIS)\*

By S. W. HAIGLER, *St. Louis, Mo.*

Hookworm disease in dogs is due to the parasitic infestation of the adult hookworm (*Uncinaria caninum*) in the small intestines, and infestation of the entire body by the larvae. It is characterized by the discharge of the ova of the worms in the feces, by emaciation, gastro-intestinal disturbances, progressive anemia, and weakness. There is a constant tendency to relative immunity as the dog reaches maturity.

The disease differs from the analogous condition in the human in that the infestation in mature dogs is so frequently not associated with any symptoms, whereas in the human, even in adults, the parasites almost invariably cause noticeable abnormalities. The hookworm-infested mature dog is, to all practical purposes, as a rule, nothing more than a carrier.

### DISTRIBUTION

Hookworm infestation is very prevalent throughout the entire country, particularly in the warmer climates, and is responsible, directly or indirectly, for the high mortality among puppies and young dogs.

In response to a letter directed to the various parts of this country by the writer comes the information that the mortality among dogs from this condition alone varies from 25 to 80 per cent. I wrote to practically all sections of the United States for information along this line, but unfortunately did not hear from all of these. However, from all replies, with the exception of Canada, it seems that hookworm infestation in dogs constitutes either a minor or major problem in the various localities. A reply from the Ontario Veterinary College advises that this condition does not appear to prevail in that locality. However, recently I have found, upon examination of the feces, numerous ova in three dogs shipped to St. Louis from different parts of Canada.

### ZOOLOGICAL FEATURES

The *Uncinaria caninum* is a small thread-like parasite which belongs to the family Strongylides. The end of its head is like a

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.



bell-shaped capsule, with a mouth provided with six hook-like teeth. By means of the bell-shaped disk and the teeth on the inner side of its mouth, it buries its head in the mucous membrane of the small intestines and sucks blood. So firmly attached are the heads, that generally they are seen clinging to the mucous membrane on postmortem. The female is longer than the male.

#### MODES OF INFECTION

There are two modes of infection, namely, through the mouth and the skin. Infection gains entrance through the mouth by allowing the dog to drink water from infected surface pools and insanitary feeding and watering pans. Bones are a great source of ova, as well as larvae, gaining entrance to the mouth, and should be fed only on clean floors or on grounds where dogs are not kept. Skin infection is accomplished by the larvae boring through the unbroken skin, and subsequently gaining entrance to the entire body. In 1903 Looss proved skin infection by the following experiment: He shaved the back of a dog free from hookworm and placed on it some mud heavily infested with *Uncinaria caninum*. The animal was properly bandaged to prevent mouth infection, and after two hours the mud was removed and the area thoroughly scrubbed with absolute alcohol. The mud contained only one-sixth as many larvae as it did when applied to the dog's skin. The dog died in ten days, and at autopsy an enormous number of larvae were found on and in the walls of the small intestines.

#### LIFE CYCLE OF THE *UNCINARIA CANINUM*

The adult worm inhabits the small intestines, where it attaches itself and gnaws away small areas of mucous membrane. Associated with these numerous small erosions, considerable hemorrhage takes place, and opportunity is afforded for infection of the intestines by bacteria which are always present.

Eggs are produced by the attached females in tremendous numbers and pass out with the feces and hatch into motile embryos. The point is worthy of note that here the eggs will not hatch in the intestines, and, therefore, in order for the parasites to increase in a given animal, the embryos hatched out on the ground must regain entrance to the body. Furthermore, in an animal isolated from feces, the infection can last only for a time corresponding to the normal span of life of the adult parasite. Unfortunately, adult hookworms have been known to live as long as six years.



The hatching of the eggs in the stools takes a variable time, depending upon the temperature, amount of moisture present, character of the soil, and other factors. It may take only a few hours or, under less favorable conditions, several days. The embryos feed upon, and crawl about in the feces for a short time, and then the first of a series of moults takes place. These moults consist essentially of a casting-off of the skin. After the first moult, the parasite no longer has a mouth and is not dependent upon outside sources for food, and is therefore free to migrate from the stool. The usual migration is lateral, or may be down into the ground. The usual course is for the migration to follow the movement of ground water. Experimentally, the larvae have been observed to migrate up through the ground for a distance of six feet in approximately three days. The point to bear in mind is that removal of the fresh stool means removal of the potential hookworms, whereas removal of the stool after it has lain around for some time diminishes their number but very little.

#### THE INFECTIVE STAGE

An incomplete moult takes place usually in about six to ten days after passage of the stool, in which the skin is not shed but remains and serves as an additional protective coat to the parasite. *This is the infective stage.* The parasite is still microscopic in size, but becomes much more actively motile, and the movements take on a boring character. The skin which is retained serves as an additional protection to destructive influences of all kinds. The parasites in the so-called encysted stage live about one year and are infective throughout. During this stage the larvae have a tendency to crawl up upon such objects as blades of grass, etc. Attention may be called to a practical point here: They cannot crawl on anything that is perfectly dry, and thus animals are more likely to become infected when the vegetation is damp; as after a rain, early in the mornings, and late at night.

The larvae gain entrance to the body of the dog largely by penetration of the skin, and to some extent by way of the mouth on food bones, foreign bodies, and drinking water. Those which penetrate the skin usually get into the capillary blood circulation and are carried to the lungs. Some get into the tissue spaces and finally stop in the lymph-glands. Those which reach the lungs bore into the little air sacs which communicate with the

trachea, from which they migrate up to the throat, and are swallowed. These larvae can be found passing up through the trachea twenty hours after they have been placed upon the skin of a dog experimentally, and have been observed as soon as three hours after penetrating the skin.

After having been swallowed, they pass to the small intestines, undergo a final moult, attach themselves, develop into adult hookworms and soon begin to lay eggs.

#### PATHOLOGICAL ANATOMY

The gross lesions, as well as pathological findings, will vary considerably, depending upon the degree of infection, resistance of the host, and the endurance of the disease. As a general rule one finds general anemia of all organs in young dogs, discoloration of the peritoneal fluid, dark red areas which can usually be seen through the serosa, and a lack of elasticity of the intestinal walls. Practically all lymph-glands are enlarged. Upon opening the intestines the contents is of a hemorrhagic nature, and usually hookworms can be seen unattached. In animals that have just died, the worms may be seen still attached to the intestinal walls. At the point of attachment, small hemorrhages or erosions are present, and there is acute catarrh or chronic inflammation of the mucosa.

Microscopic changes in the intestines are relatively insignificant. Small foci are seen where there is loss of substance in the mucosa. Frequently no other change is observed. Various secondary changes occur. The lesions may be surrounded by a small number of wandering cells, lymphocytes, plasma-cells, eosinophile polynuclear leukocytes, and varying amount of blood pigment. Occasionally the inflammatory process extends into the submucosa. This, however, represents secondary infection.

The lesions occur in the greatest numbers in the jejunum. They are occasionally found in the duodenum, and in small numbers in the ileum. They have been reported also in the stomach.

The uncomplicated focus is so superficial as to be very difficult to identify. The glands of the mucosa in those cases where parasites are numerous are usually very large and show great numbers of goblet-cells.

## SYMPTOMS

There are few diseases in which the symptoms are so variable in degree as in uncinariasis. This may be expected when we consider the mode of attack of this parasite. However, clinical evidence of the disease will depend largely upon the age of the animal and the degree of infestation.

In puppies we find anemia, weakness, irregular appetite, and emaciation. The feces are usually bloody, and there is more or less tympanites. In the later stages there is vomiting, the mucous membranes become whitish-yellow in color, a very disagreeable odor is present, and the animal collapses and dies very suddenly. I have seen a whole litter of puppies die within a period of twenty-four hours.

A mature dog infected with hookworms frequently shows no visible symptoms, and to all practical purposes, as a rule, is nothing more nor less than a carrier. However, there are exceptions. Gastro-intestinal disorders are sometimes traceable to the presence of large numbers of uncinaria in the adult dog. When the vitality of an animal infected with hookworms, but apparently healthy, has been lowered, various symptoms may become evident. For example, nursing a large litter of puppies of being heavily in whelp, distemper, improper feeding, or anything that tends to lower the resistance of the animal, may be a factor. I have observed bird dogs to play out before the day was over, and have known hounds to quit the chase, that, upon microscopic examination of the feces, showed large numbers of hookworm eggs. It is the general opinion among greyhound racing men that infected hounds, though apparently healthy, cannot give their best in a race.

## DIAGNOSIS

Diagnosis is possible only with the aid of the microscope, and only repeated negative findings extending over a considerable time indicate freedom from infection. An early and accurate diagnosis is extremely important and equally difficult. The clinical picture, although quite often suggestive, is seldom sufficiently characteristic to make a definite diagnosis. However, the symptoms presented are by no means valueless, as certain phases of the disease can be recognized only in this way. That is, after treatment the parasites in the lungs or elsewhere may find their way to the intestines in considerable numbers, and their arrival be detected by the symptoms presented before they begin

to lay eggs. Such a diagnosis, however, is nothing more than a guess and will be wrong as often as correct. The presence of the mature parasite can be detected with the microscope by finding the ova in the stools and, when found, the evidence is unquestionable. On the other hand, a single examination yielding negative results does not always indicate freedom from intestinal infestation. Several negative findings at two-week intervals usually indicate that the animal is free from parasites, either in the intestines or elsewhere in the body, and should always be obtained before treatment is discontinued.

The importance of diagnosis, especially the recognition of carriers, cannot be overestimated, as it is largely by treatment of all disseminators of eggs that the supply of eggs and infectious larvae is reduced. Many eggs will escape the most painstaking technic of stool removal and hatch, and once the larvae have reached the migration infective stage, the hope of destroying them is practically nil.

#### PROPHYLAXIS

Hookworm disease is theoretically one of the easiest to prevent. Its cause is known; all the vital characteristics of the parasite are understood; it has no secondary host, like tapeworms, and it is not easily carried from one place to another except by the dog itself.

Practically, it is one of the most difficult diseases to eradicate on account of its wide extent, its intensity in favorable localities, the enormous reproductive power of the adult worms, and the rapid development of the ova to the infective stage.

The problem of prophylaxis involves the following essential elements:

1. Stopping the danger of infection by exterminating the mature worms in the intestines of dogs in order to check the supply at the source. This means treating all infected dogs repeatedly until microscopic evidence of freedom from parasites is obtained.
2. Prevent the growth and existence of larvae in kennels where they develop. This is not so simple as it may seem when we realize that the eggs hatch rapidly under favorable conditions, that the larvae migrate rapidly, that they will live for about one year in the ground, and are not killed by freezing, snows, etc. Neither are they destroyed by plowing or turning over the ground. Therefore, consider the dog-yard as a constant potential source of infection. Encourage dogs to lie in some dry part of the yard

where they seldom or never defecate. Keep other animals and birds out of the dog-yards, as they will redistribute the feces and make it impossible to remove them thoroughly. While this is not always possible, prompt removal of the feces, and a thorough burning of the ground immediately around and beneath the stool will destroy the eggs as well as the larvae. If the runs are concrete, disinfect same with 10 to 25 per cent liquor cresolis compound and allow it to remain on for fifteen minutes. Then flush with water to prevent the poisonous or caustic effect of the cresols.

#### TREATMENT

Many drugs have been used for the removal of the adult hookworm from the intestines, such as thymol, beta-naphthol, oil of chenopodium, etc. Two agents brought out by Hall and his associates are the most effective and least toxic to the animal. The first one, carbon tetrachlorid, has come into general use and is very effective. The second, tetrachlorethylene, has more recently been brought to the attention of veterinarians, and promises to become more popular than carbon tetrachlorid, owing to the fact that it is less toxic and there is less danger of asphyxiation if released in the dog's mouth.

Prior to the administration of any vermifuge, it is advisable to fast the animal long enough to allow the stomach to empty but not long enough to cause weakness or distress. It is also well to administer a cathartic, preferably sodium sulphate, as the latter tends to dissolve and remove intestinal chyme and mucous, which protects the parasite to some extent against the action of the vermifuge. Some advise giving of a cathartic following the vermifuge, but I prefer giving it before, especially in the absence of a large number of roundworms or tapeworms.

It is well to bear in mind that, though your vermifuge may be effective against 99 per cent of the hookworms in the intestines, their destruction may be only 20 per cent of the worms actually present in the body. Therefore, it is evident that a repetition of the treatment, as soon as eggs reappear in the feces, is necessary. In badly infested animals it is advisable to repeat the treatment twice, at three-week intervals, whether eggs are present in the stool or not. Larvae which have just arrived in the intestines, and have not as yet undergone the final moult, are not likely to be killed by any vermifuge administered.



to lay eggs. Such a diagnosis, however, is nothing more than a guess and will be wrong as often as correct. The presence of the mature parasite can be detected with the microscope by finding the ova in the stools and, when found, the evidence is unquestionable. On the other hand, a single examination yielding negative results does not always indicate freedom from intestinal infestation. Several negative findings at two-week intervals usually indicate that the animal is free from parasites, either in the intestines or elsewhere in the body, and should always be obtained before treatment is discontinued.

The importance of diagnosis, especially the recognition of carriers, cannot be overestimated, as it is largely by treatment of all disseminators of eggs that the supply of eggs and infectious larvae is reduced. Many eggs will escape the most painstaking technic of stool removal and hatch, and once the larvae have reached the migration infective stage, the hope of destroying them is practically nil.

#### PROPHYLAXIS

Hookworm disease is theoretically one of the easiest to prevent. Its cause is known; all the vital characteristics of the parasite are understood; it has no secondary host, like tapeworms, and it is not easily carried from one place to another except by the dog itself.

Practically, it is one of the most difficult diseases to eradicate on account of its wide extent, its intensity in favorable localities, the enormous reproductive power of the adult worms, and the rapid development of the ova to the infective stage.

The problem of prophylaxis involves the following essential elements:

1. Stopping the danger of infection by exterminating the mature worms in the intestines of dogs in order to check the supply at the source. This means treating all infected dogs repeatedly until microscopic evidence of freedom from parasites is obtained.
2. Prevent the growth and existence of larvae in kennels where they develop. This is not so simple as it may seem when we realize that the eggs hatch rapidly under favorable conditions, that the larvae migrate rapidly, that they will live for about one year in the ground, and are not killed by freezing, snows, etc. Neither are they destroyed by plowing or turning over the ground. Therefore, consider the dog-yard as a constant potential source of infection. Encourage dogs to lie in some dry part of the yard



where they seldom or never defecate. Keep other animals and birds out of the dog-yards, as they will redistribute the feces and make it impossible to remove them thoroughly. While this is not always possible, prompt removal of the feces, and a thorough burning of the ground immediately around and beneath the stool will destroy the eggs as well as the larvae. If the runs are concrete, disinfect same with 10 to 25 per cent liquor cresolis compound and allow it to remain on for fifteen minutes. Then flush with water to prevent the poisonous or caustic effect of the cresols.

#### TREATMENT

Many drugs have been used for the removal of the adult hookworm from the intestines, such as thymol, beta-naphthol, oil of chenopodium, etc. Two agents brought out by Hall and his associates are the most effective and least toxic to the animal. The first one, carbon tetrachlorid, has come into general use and is very effective. The second, tetrachlorethylene, has more recently been brought to the attention of veterinarians, and promises to become more popular than carbon tetrachlorid, owing to the fact that it is less toxic and there is less danger of asphyxiation if released in the dog's mouth.

Prior to the administration of any vermifuge, it is advisable to fast the animal long enough to allow the stomach to empty but not long enough to cause weakness or distress. It is also well to administer a cathartic, preferably sodium sulphate, as the latter tends to dissolve and remove intestinal chyme and mucous, which protects the parasite to some extent against the action of the vermifuge. Some advise giving of a cathartic following the vermifuge, but I prefer giving it before, especially in the absence of a large number of roundworms or tapeworms.

It is well to bear in mind that, though your vermifuge may be effective against 99 per cent of the hookworms in the intestines, their destruction may be only 20 per cent of the worms actually present in the body. Therefore, it is evident that a repetition of the treatment, as soon as eggs reappear in the feces, is necessary. In badly infested animals it is advisable to repeat the treatment twice, at three-week intervals, whether eggs are present in the stool or not. Larvae which have just arrived in the intestines, and have not as yet undergone the final moult, are not likely to be killed by any vermifuge administered.

In conclusion it may be said that unless one is interested in the propagation of hookworms, it is better not to breed a bitch than to breed one before she has been rid of worms and proved so by microscopic examination of the feces.

If the above suggestions are followed, the pathogenic influence of hookworms can be practically eliminated, yet complete eradication of the parasite will be found extremely difficult, and the folly of the presumption, that the occasional administration of a "sure shot" will accomplish it, becomes apparent.

#### DISCUSSION

DR. FLOYD PERRIN: I guess I was one of the many in our locality who for a number of years seldom ever saw a hookworm around Lincoln. The past year, however, there seemed to be considerable of them and there is one thing in the treatment I wish the writer had elaborated more upon and that is the dosage and the retaining of the capsule after it is administered.

DR. HAIGLER: I believe that, if the dog's stomach is really empty, almost anything you give him in the way of a vermifuge will be vomited. It does not hurt to give him a small feed shortly afterward—just a little bit of raw meat tends to settle his stomach.

DR. H. J. HAGERTY: How long after giving him the treatment would you give him this small piece of meat?

DR. HAIGLER: Any time right afterward. I do not believe it will hurt the action of the vermifuge at all. I do not give a laxative after giving the treatment. You will find, after a little study, that the hookworm is hard to get at. The idea is this: The sodium sulphate will flush the bowels and remove the mucus around the hookworm and, if you get all of that out, I do not think you will need to give a cathartic. If you have a large number of large worms and tapeworms, it might be advisable to follow with a cathartic as they might cause stoppage of the bowels. However, I always give my laxative first.

DR. J. V. LACROIX: A point of much importance which I should like to hear discussed is the mode of infestation by contact with the skin and the effect of the larvae on the respiratory system; manifestation of symptoms that will either mask or simulate distemper. I am sure all of us have learned a little about this within the last five or six years.

DR. C. S. CHASE: We have a great deal of hookworm infestation, which has wiped out a large number of big kennels and made the proposition of raising dogs impractical from an economic standpoint. No end of money has been spent in order to try to remove the hookworm from infested kennels, in many instances without results. I had charge of one kennel of imported police dogs where a large amount of money was invested and, after four or five years of raising puppies upon the same soil, the greatest care being taken to disinfect the soil thoroughly, and everything within our power being done, we found it an absolute impossibility to keep the place free from this infestation. In a short time they would die. We found that the best results came from bringing the dogs up in concrete kennels, and that it was absolutely impossible to raise them to adults unless you did something of that kind. We found, also, that in these cases where our kennels were infested and we had an outbreak of distemper they would die. If we attempted to worm our pups and they had distemper, it was almost invariably fatal. There is only one thing I can see that we can do and that is to treat our bitches before they conceive and make sure the bitch herself is free from parasites, if we are going to raise pups successfully. And my experience has been that you can not raise them successfully upon the ground. We should have kennels that are concrete and wood floors that can be taken out and sterilized and everything disinfected and we may get results. But, in my opinion, not otherwise.

DR. J. E. CRAWFORD: I might say that my observation has been very much the same as Dr. Chase's. We have had regular epidemics from the hookworm. I have had the same experience as he has with kennels that were built in the most modern way and no end of money expended in their construction—after three or four years they became so badly infested with hookworms that it was absolutely impossible to raise puppies. In two or three years they would die. In these cases, we did just as Dr. Chase said—concreted the kennels and, by flushing the kennels every day and using a blow-torch, we got so we could raise puppies in these kennels.

DR. E. E. PATTERSON: My experience with the puppy has been that at the age of three or four months he has hookworms and also distemper. You take him to the hospital and he invariably dies. This has been my experience. If you send him home and he is treated at home, the chances to get well are a lot better than in the hospital, but usually, however, they die. I believe that has been the general experience of veterinarians throughout Michigan. I would like to ask some of the members in this state if their experience has been the same.

DR. H. K. MILLER: We find in New York that dogs that are shipped from practically all parts of the country have hookworms, more or less. This is not only of late years, but I remember long ago, years back, we found them, long before we thought of using the microscope to make fecal examinations. Of late in Long Island we have been using kerosene, turning the soil over and using kerosene. I would like to know if anybody else has tried that.

DR. J. E. SHILLINGER: We have done a little work along the line of soil disinfection in our kennels and fox-yards and have some evidence to indicate beneficial results. We have used sulphuric acid and found it more beneficial than lime. I would like to see it tried out by those up against this proposition and see whether or not my present convictions may be borne out.

DR. J. C. FLYNN: Dr. Haigler did not mention the feline in his paper. We find that a large percentage of the cats brought into the hospital for treatment are suffering from hookworm infestation. They present rather a typical picture—easily irritated, thin, emaciated, anemic and have persistent diarrhea. They are very difficult to bring back. The ability to propagate the species was brought to my attention very forcibly one day when I picked up a small section of a worm and put this section under the microscope. You have all seen a factory smokestack when under full blast. Well, when that section of the worm was placed under the microscope the heat evidently stimulated this worm to evacuate in very much the same fashion—they came out a typical picture of a smokestack, thousands and thousands of them. It does not seem possible, but it is possible. There is no question but that the hookworm infestation in any kennel is a serious problem. In northern Missouri, where I was called to take charge of a kennel having considerable trouble, I had quite a time with the kennel man, and I presume most of you have had the same experience as my own. The kennel man is usually a pretty hard man to handle. When he started in with his difficulty he had 300 Airedales and Pointers, and they are valuable dogs. He had lost 150 before he called any one. When he called me in to see them (it was 120 miles from my office) and I drove into his yard, he walked out and said: "There are just two things I don't want you to tell me—I have no distemper and no worms." "Well," I said, "that's very nice." The first he showed me were nine Airedales four months of age. I looked them over and said, "You have nine cases of distemper here." "Well," he said, "I'm not going to argue very much about distemper, but I know I haven't any worms. There are two of my dogs that died just before you got here; they're lying over there on the wood-pile." "Well," I said, "let's open them up." I opened them up and found thousands and thousands of hookworms. I raked the mucus away and showed him. I said, "Now seeing is believing; you now believe you had hookworms, don't you?" "Yes, I do," he said. "Well, you also have distemper. You have all of your dogs badly affected. The resistance of your animals is lowered to such an extent that when distemper strikes they live only a few days." So we see that distemper and hookworms are pretty likely to be numbered with the fatalities.

## EMERGENCIES FOLLOWING AUTOMOBILE INJURIES TO SMALL ANIMALS\*

*By H. W. BROWN, Fort Wayne, Ind.*

The Motor Age is here, and with it has come a menace to our small animals, in the rural districts, as well as in the crowded cities. Our country, the greatest live stock country in the world, has very little territory which cannot be reached by automobile. It is cross-sectioned in every direction by good roads, on which you may see automobiles going to and fro, any season of the year, traveling at a rate of from ten to seventy miles per hour.

In the days of Old Dobbin and the shay, it was very unusual to see a small animal (domesticated or wild) fatally or even seriously injured by a passing vehicle, but in this age scarcely a day passes that the busy veterinarian is not called on to administer to some unfortunate animal, which has been injured by an automobile.

This change is not altogether due to better roads, increase in speed and so forth, but may be attributed, in a large part, to the fact that Old Dobbin was a kindred brother, and our small animal friends knew his habits, and were capable of estimating his speed, and by that also the speed of whatever vehicle he might be drawing, and were more often able to avoid injury.

One other great difference is the high-powered automobile head-light, focused on the road at night, which blinds the animal trying to get across the road, and renders it almost helpless to avoid injury.

Examining an animal which has been injured by an automobile is not an easy matter. It often requires an unlimited amount of patience and diplomacy, to conduct a thorough examination and, at the same time, keep the owner convinced that you are not causing unnecessary pain to the animal. In some instances it is next to impossible to conduct the examination with the owner present, as the animal, at the least touch, will cry like as if it is being badly hurt, but in reality the outcry is caused by fright.

Very often animals which have always been gentle are frightened to such an extent that they will not permit their owners

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

to touch them, without trying to avoid it by either biting or scratching. Here the first emergency arises, and that is to be prepared to restrain the animal properly, avoiding injury to yourself and assistant, causing a minimum amount of pain to the patient, and by doing so convince the owner you can restrain the animal much better than he can. At the same time, try and gain the confidence of the animal, which, if accomplished only in part, will aid one in carrying out a thorough examination and lessen the outcries of the animal.

The importance of a thorough examination cannot be emphasized too much, for it is necessary in order that one may render an intelligent probable prognosis, but I believe that only first aid should be given at the scene of the accident (except in extreme cases), and the animal removed to the hospital as soon as it is deemed possible without lessening the chances for recovery.

#### PROGNOSIS SHOULD BE GUARDED

After a complete examination at the hospital, a diagnosis may be given, but if any internal injuries are suspected, the prognosis should be guarded or withheld entirely for seventy-two hours awaiting developments. Very few cases have come under my observation that necessitate a fatal prognosis at the scene of the accident, and advising the owner that the animal should be destroyed at once. You may not agree with me, but I can see no reason why we should take any different attitude toward our patients when injured by an automobile than do the members of our sister profession, since many small-animal hospitals are as well equipped to care for their patients, from the time of the injury to the termination of the case, as human hospitals are equipped to care for us.

When we are called to see a pet which has been injured by an automobile, we meet with the most difficult cases we have to deal with. It is an emergency in every sense of the word, oft-times requiring all the skill, diplomacy and patience one has. A hurried examination and prognosis at the scene of the accident may prove to be for you, as it has for me, a serious mistake, and the animal may live for years to prove the fallacy.

#### APPLY ARTIFICIAL RESPIRATION

On arrival at the scene of the accident, the animal is first properly restrained, then the pulse and respiration taken. If the pulse is weak, or if any heart-beat is detected at all, and if the respiration is paralyzed, two or three minims of cyanid are



placed on the tongue, artificial respiration begun at once and continued for at least ten minutes. At the end of that time, if the heart is still functioning, it is continued until something near normal respiration is restored, or so long as the heart continues to function.

We find it difficult to differentiate, in many cases, between shock and internal hemorrhage following an injury, especially if the animal is unconscious, or semi-conscious. We give a dose of surgical pituitary solution subcutaneously, followed by a dose of fibrogen and then apply heat externally. Next the animal is moved to the hospital for further treatment.

If there are any external injuries, they are given first-aid treatment, only temporary splints and pressure bandages are applied at the scene of the accident. Hypnotics are not given except in extreme cases where the patient is in great distress and extremely restless. Then H. M. C. or morphin may be given hypodermically.

After the patient is removed to the hospital, a thorough examination should be given to determine the extent of the injury. Fractures of the extremities should be cast before swelling takes place, but if swelling is already present the cast should not be applied until the swelling is reduced, which may be accomplished much sooner by application of an alcohol pack and bandage. The X-ray has proven a great asset in making a diagnosis in obscure cases of fractures and dislocations.

We do not attempt to cast fractures until the patient is completely relaxed, which usually requires a general anesthetic. For casting we use plaster bandage, which has proven by far the most satisfactory and given the best results, although many other devices have been tried out. In talking with a number of small-animal practitioners, I noted that their objection to the use of plaster of Paris was not due to the poor results obtained, but because they are so hard to remove. This difficulty may be easily overcome by the use of a cast cutter.

It is not the purpose of this paper to introduce a number of new methods of handling emergency cases, but to bring before you the same old story, probably told in a little different way and refreshing our memories of our obligations to our clients and patients when under fire handling such.

I do not agree with the statement made by our president, at one of the joint association meetings, that the specialist is only a fad. It is my firm belief that the veterinarian who limits his

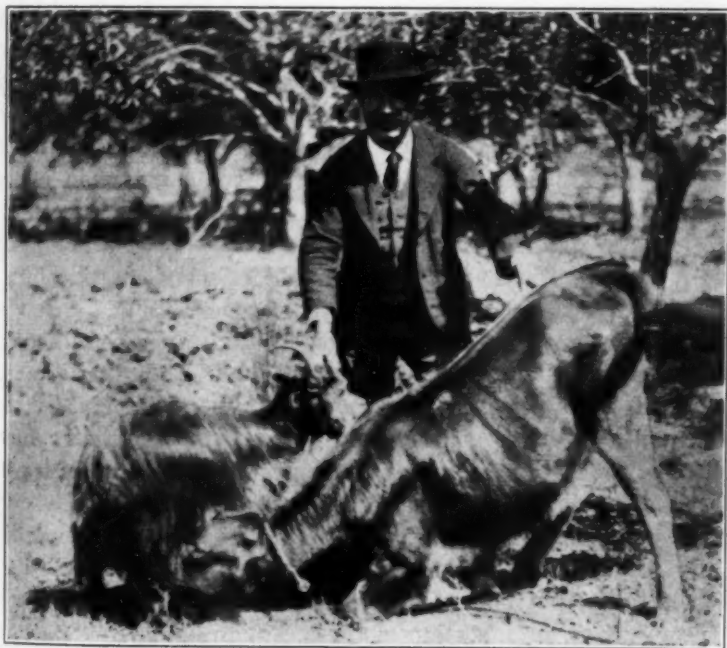


practice to small animals and who has properly prepared himself for this branch of work, is here to stay and the success of this will be in proportion to the effort put forth by each individual.

We should benefit by each mistake and be prepared for these emergencies, which we are sure to meet with more often every year and by doing so relieve ourselves of many embarrassing situations, remembering that the successful handling of a difficult case is the best advertisement any practitioner can have.

### North Carolina Ladies Organize

At the summer meeting of the North Carolina State Veterinary Medical Association, held in Greensboro, June 27-28, 1928, a ladies auxiliary was formed, with Mrs. William Moore, of Raleigh, as president; Mrs. J. Howard Brown, of Rich Square, as vice-president; and Mrs. W. T. Scarborough, of Raleigh, as secretary-treasurer. A constitution and by-laws will be drawn up and adopted at the winter meeting, to be held in Raleigh, January 23-24, 1929.



GOAT NURSES CALF

Photograph of goat nursing good-sized calf. The scene is in Portugal. Dr. Adolph Eichhorn secured the picture while in Europe the past summer.

## FOREIGN BODIES IN BOVINES\*

By E. E. WEGNER, Pullman, Wash.

*College of Veterinary Medicine, State College of Washington*

The subject that has been assigned to me for discussion is one that is becoming increasingly important. There was a time when cattle were kept in great number, on ranges or large pastures, when this ailment was almost unknown. However, as our problems of domestication require us to keep greater numbers on smaller areas of land, the animals are necessarily more closely confined and artificially kept, and it is not uncommon for large numbers of animals to suffer as a result of the ingestion of foreign bodies that happen to be mixed with the food.

It is not necessary to go into detail with regard to the nature of the individual foreign substances. Perhaps the most common are wire, nails, and the tip of a piece of bailing-wire that has been cut near the end when the bale is opened; also pieces of glass, needles, tacks, etc., are not infrequently found, and larger objects have been occasionally reported. Needless to say, most of the foreign bodies produce no ill effects. Ordinarily we expect them to be collected in the reticulum where they are slowly dissolved by the fluids in this portion of the digestive tract. Metallic objects that have remained there for any considerable length of time are found to be corroded and no doubt are eventually all dissolved and disposed of in that way, producing no ill effects upon the animal.

It is impossible to estimate the percentage of foreign bodies that are swallowed and produce no ill effects, but without a doubt it is a very small percentage that cause trouble. When we consider, however, the great number of animals that are kept in close confinement in our dairy and beef herds, the number actually deceased in a year is very great, and the toll taken by this sort of an accident is considerable, so great in fact that a more careful consideration of a method of treatment is very desirable.

We are not able to explain the exact method by which the digestive organs of the ox are able to localize these foreign bodies in the reticulum, but numerous observations assure us of the fact that other portions of the digestive tract are seldom injured as the result of the ingestion of these foreign bodies.

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

The harm produced by these foreign bodies is caused by the penetration of the walls of the digestive tract, and the injury to adjacent organs. We know from numerous observations and autopsies that these foreign bodies may pierce the tissue in any one of several directions, necessarily producing lesions in the organs that they penetrate. Occasionally they go to the right, and occasionally to the left, perhaps very seldom do they make an upward course. They may even point downward in some instances, but this is a rare exception. By far the greatest percentage take a direction directly forward, and since the anterior wall of the reticulum is in contact with the posterior wall of the diaphragm, it would follow that many of these penetrating objects would pass forward through the diaphragm into the thoracic cavity and produce their ill effect upon organs that are located in that cavity. It is the experience of veterinarians, generally speaking, that chest complications are most likely to follow cases under discussion.

#### SURGICAL TREATMENT MUST BE APPLIED EARLY

Needless to say, when foreign bodies have once passed through the wall of the reticulum, into adjacent organs, they have passed beyond the reach of the surgeon, as it is impossible to determine accurately the path of each individual foreign body. If surgical treatment therefore is to be effective, it must necessarily be applied in the early stages of this ailment. This, however, is not a new principle when applied to surgical operations.

The length of time required for an animal to show ill effects from the intrusion of a foreign object varies greatly in different cases. The rate of progress maintained by these bodies must vary greatly also. A sharp-pointed object of uniform size might pass through the tissues very rapidly, and reach vital organs some distance away in a few days, while blunt objects, such as nails with enlarged ends, might remain for some time, protruding only part way through the wall of the reticulum. It is for this reason that some animals manifest a much more acute sort of ailment than others, that some appear to suffer a rather chronic form of the disease, while others manifest alarming symptoms almost from the outset.

A diagnosis of this condition must be made early if surgical interference is to be helpful. The symptoms that are commonly manifested are, first, general indisposition, usually inappetence, a general disposition which will cause the animal to remain

inactive and general inactivity on the part of the digestive tract, which leads to the observation of constipation. Frequently there is a characteristic grunt when the animal is required to move, or even when standing or lying down in the most comfortable position. In these early stages it may be very difficult to differentiate this condition from constipation or impaction of the rumen due to other causes. In some instances the animal may stand with the left elbow turned outward in an apparent effort to give relief to the affected side. In most suspicious cases a careful examination of the chest cavity should be made. This may be done by percussion, and by applying pressure with the fingers at each of the intercostal spaces. This should be done systematically on both sides in an effort to locate any area of soreness that may exist about the chest wall. Sometimes pressure applied in an upward direction from a point above and just behind the posterior end of the sternum will assist in determining the presence or absence of soreness in this region.

#### ASPIRATION AND EXPLORATION OF THE CHEST

In cases that have suffered for some time, and where there is an obvious chronic involvement of adjacent organs, and where the general health of the animal is already impaired, perhaps there is no treatment that is likely to be helpful enough to justify any surgical procedure. Aspiration of the chest and exploration with the trocar in an effort to find internal abscesses is sometimes resorted to, and a better conception of the condition is oft times gained in this way, but in these advanced cases there is very little that can be done to restore the health of the individual after extensive damage to adjacent organs has already occurred. If surgical procedure is to be successful, it must be instituted very soon after the appearance of the first symptoms.

It is in this connection that the work of Dr. Carl Hjort, of Stanwood, Washington, commands considerable interest. For about two years he has operated upon a number of these cases with a very satisfactory percentage of successes. I have reports also from Dr. J. G. Jervis, of Milner, British Columbia, indicating that when cases are properly selected very gratifying results may be obtained from surgical operations. In reporting his operation before the joint meeting of the Oregon, Washington and British Columbia veterinarians in Bellingham, Washington, in June, 1927, Dr. Carl Hjort advised that in most of these early cases he made an exploratory opening in the wall of the abdomen at

the cite usually selected for rumenotomy. He then introduced his arm between the abdominal wall and the rumen, and passed it forward and very slightly downward around the left side of the rumen, and made a careful search of the space between the reticulum and the diaphragm.

In many of these early cases he encounters evidence of local irritation at this point. This is manifested by adhesions between the reticulum and diaphragm in this region. After this evidence of inflammation is encountered he suggests the advisability of breaking down this new tissue in the hope of encountering the causative agent. Dr. Hjort advises that in quite a high percentage of the cases selected for operation he has found the foreign body wholly, or partially, in this space, and whenever it is possible to do so, he removes it by breaking away the surrounding tissue, grasping it with the fingers and removing it. Occasionally, however, he encounters the point of a large-headed nail, or some other object that cannot be drawn through the wall of the reticulum without causing greater injury to the wall of this organ. When this condition is encountered he may push it back into the reticulum and leave the case for nature to dispose of, as there is little likelihood that this or any other foreign body would find this opening again, and animals treated by this method have made uneventful recoveries.

#### EXPLORATORY OPERATION DOES NO HARM

Animals treated by this method, where foreign bodies have been found, have in nearly all cases shown a very decided improvement. In cases where no foreign bodies could be found the minor nature of this exploratory operation has not seriously affected the health of the animal, and the men who have had the most experience with this operation feel sure that one should not hesitate to perform it with the belief that harmful effects would follow.

Dr. J. G. Jervis reports that, in cases where it is difficult to remove the foreign body from the space between the reticulum and the diaphragm, he frequently performs a rumenotomy and removes all foreign substances from the reticulum by this method. Cases reported by Dr. Jervis show an improvement in the animals' health, as evidenced by food consumption and milk-flow, in fact this operation frequently produces good results almost immediately. In cases where no evidence of foreign bodies could be found it was noted that the general effect upon the patient was



not particularly harmful, as the exploratory operation is a minor one. The abdominal wound is closed by the usual method.

In view of the fact that this operation has met with considerable success in the hands of men who have had the most experience with it, I believe we are justified in saying that it should be more widely adopted. Keep in mind that its sponsors do not claim that it is to be recommended in all cases of foreign bodies in cattle, but only in those cases where an early diagnosis is made, and where there is a probability that the foreign body has not passed entirely through the structures that form the anterior wall of the reticulum, and the structures adjacent to it. It is well to keep in mind that an exploratory operation is not serious, and if no evidence of foreign bodies is encountered, the patient is in no way endangered as the result of the simple surgical procedure.

The credit for this operation is due to Dr. Carl Hjort, of Stanwood, Washington, who, I believe, deserves the entire credit for its institution and perfection, as far as it has been perfected to date.

#### DISCUSSION

DR. R. R. DYKSTRA: I just want to go a little bit farther, probably, than the statement made by Dr. Wegner, and inject into the discussion the surgical treatment of cases of traumatic pericarditis where the foreign body has undoubtedly passed forward into the pericardial sac.

Unfortunately, in the surgical handling of this condition in an advanced state of the disease, the results are not very good. The only reason I am bringing it up here is because the animal usually is in such an advanced stage that the owner himself feels that something must be done if the life of the animal is to be saved. Usually he is willing to agree to an operation.

I can not speak at all from practical experience in this operation for the relief of foreign bodies in the pericardial sac. In our surgical exercises we have done the operation many times. The operation consists of placing the animal under the influence of a general anesthetic, then making a linear incision over the eighth rib, counting from behind forward. The incision corresponds to the general direction of the rib, is exactly over the rib, and extends upward from the costochondral articulation for a distance of about eight inches. That exposes the rib, and we dissect very carefully, usually by blunt dissection with the finger. We dissect around the rib so as not to injure the pleura in this stage of the operation.

After the rib has been thoroughly freed from all surrounding tissues for a distance of approximately eight inches, extending from the costochondral articulation upward, we then take one of the obstetrical chain-saws and pass it under the rib. By means of the chain-saw we divide the rib at the upper portion of the incision. Then one can take that divided rib, and by bending outward on it, one can break it off at the chondrocostal articulation. That exposes the pleura, and we make a very small incision into the pleura so as to admit the air slowly. In our surgery exercises the animals usually show quite alarming symptoms at that stage of the game. The breathing becomes very rapid and very embarrassed, but that disappears in two or three minutes, and we enlarge the incision through the pleura, exposing the pericardial sac, which, in turn, is opened. In the anesthetized patient we have permitted any number of students to pass their hands into the pericardial sac and feel all around the heart.



We permitted those animals to recover from the anesthetic. Understand, these animals we have worked on in the surgical exercises did not actually have the disease. They were simply patients for demonstration purposes.

We have permitted the animals to recover from the anesthetic to see whether they would recover, and they did. We have gone ahead and used them for other surgical exercises. I can not say what the final outcome of the operation would be.

About two months ago, we had presented at our clinic an animal in rather an advanced stage of traumatic pericarditis. It was presented as a patient. We placed it on the operating-table and went through this technic. We removed from the pericardial sac a piece of wire probably two and one-half inches long. Dr. Frick, of our staff, did the surgical work. The animal died five minutes after the removal of the foreign body. That is the only case we have had in actual practice, the only patient that had been presented to us.

This work, of course, is not all original with us. I do not want to create that impression at all, because it has been described in European literature. In fact the entire technic has been described in European literature. I do believe that in those cases of traumatic pericarditis, where the owner understands the gravity of the condition, and where he feels that if something is not done the patient is going to die, we are warranted in attempting that operation. The patient is going to die anyhow. He has a chance if you do the operation. If he does die, of course, he is no worse off than if the operation had not been performed.

DR. T. H. FERGUSON: I have had some little experience in operating traumatic pericarditis and traumatic gastritis (I have had some very interesting cases), both by the method that Dr. Dykstra just explained, removing the rib, and also by going in back near the ensiform cartilage of the sternum.

I had a cow by the name of Ollie Watson. Probably you men who are familiar with Holstein breeding remember this cow. She was a very valuable animal, with some very good records. This cow was taken sick with what apparently seemed to be simple indigestion. The herdsman gave her a quart of oil, and she apparently got better for a day or so, and then her symptoms recurred. I was called to see her and diagnosed the case as traumatic pericarditis and advised an operation, which the owner was very anxious to have performed.

We removed this cow to my hospital, and I operated. I did a rumenotomy. I found a piece of baling wire, probably eight inches long, piercing the anterior wall of the reticulum, and apparently going through into the heart. I removed that wire and sutured the stomach and finished the operation, and apparently relieved the cow somewhat. But in the course of about ten or twelve days she was apparently no better. There was quite an accumulation of fluid in the pericardial sac. These people were very anxious to go the limit on the cow, so I performed the operation of opening up the pericardial sac through the route by the ensiform cartilage of the sternum, and went in with my hand. I first removed about a gallon and one-half of purulent fluid. Then I went in with the hand and felt the heart all over carefully; could find no foreign body, but the heart had a hard-boiled feeling and a rough feeling. The pericardium was quite thick.

I put in a drainage-tube about two feet long, perforated the part that was extending up in the sac and anchored it in the pericardial sac. It was in winter, and we kept this cow right in the operating-room where it was warm. She went on for about two weeks and did fairly well.

One morning I got in about two o'clock, and went in to take a peek at Ollie Watson, and I saw she was going to die, so I let her out into a large stall so she would be handy for posting. I posted her the next day and found in the posterior vena cava a long piece of wire, probably broken off from the part that punctured into the thorax. It caused a rupture of the posterior vena cava, and, of course, the hemorrhage is what killed her.

I washed up the pericardial sac and the heart in nice shape. It seemed to have gotten along as well as you would expect a large wound on the outside of the body to progress in that length of time. I fully believe if this cow had not

had that unfortunate accident of having part of the foreign body in the blood-vessel, she would have made a recovery.

This was not apparent when I examined the heart, because I examined it very carefully, and could not detect anything in the nature of a foreign body in the heart.

I operated a cow at Madison that was brought in there by truck forty miles. We put her under chloral, used a local anesthetic and removed eight inches of the eighth rib. We removed a pail of pus from the pericardial sac, and there was apparently no foreign body in the pericardial sac or in the heart. This cow came along so she could stand up all right. The owner wanted to take her home that night because he had borrowed the truck and had to get it back the next morning. I advised him to leave this cow at Dr. West's hospital and give her a chance, but he walked her into the truck and took her home. We have never heard from that case, unless the man in charge of the clinic heard from it. But that is about the way those cases will do. If there isn't any foreign body, that you have overlooked, they will make a recovery.

The operation is not difficult. Neither is it necessary to give a general anesthetic. It can be done by the use of a narcotic and a local anesthetic, without any particular inconvenience to the cow. The heart stands the introduction of a drainage-tube in the pericardial sac nicely. It is just one more way of trying to salvage a little for the owner. I believe it is a good operation to do even in quite advanced cases.

The owner always appreciates a good effort towards saving a valuable animal, if he happens to be lucky enough to own a real valuable one. If it happens to be just a grade cow, and you want to spend the time doing it, it will give you experience on those cases. If you save the cow, the owner will certainly be pleased; that is, if you can save the cow so he can get a little salvage out of it. If you don't happen to save the animal, he is generally well pleased with his experience with the operation anyway.

DR. DYKSTRA: Dr. Ferguson and I do not agree about one thing that is quite a hobby with me. That is the use of anesthetics. My own feeling is that one must use a general anesthetic if one wants to be humane about it. The serous membranes are involved in this operation. Of all the sensitive tissues in the body, the serous membranes are as sensitive or more so than any of them.

While I agree with Dr. Ferguson that you may narcotize the animal and use a local anesthetic superficially, any of you who have felt a pleuritic stitch know how sensitive the pleura is. I think where the pleura and cardiac sac are invaded, we should be humane and use a general anesthetic.

### ONE HUNDRED PER CENT A. V. M. A.

Seventeen veterinarians are employed by the Los Angeles County Live Stock Department, under the supervision of Dr. L. M. Hurt. All of them are either members of, or have applications for membership pending in, the A. V. M. A. The staff consists of Drs. L. M. Hurt (Iowa '04), E. M. Austin (Iowa '18), A. L. Birch (Iowa '21), W. A. Clark (K. C. V. C. '10), J. F. Claire (Gr. Rap. '10), A. G. Feers (Chi. '08), E. E. Jones (Iowa '19), H. O. Keys (K. C. V. C. '13), K. G. McKay (Wash. '21), M. L. McLaughlin (Iowa '15), R. H. McMullen (Chi. '92), L. E. Pike (McK. '17), R. H. Scofield (Iowa '21), G. W. Todd (Iowa '22), C. E. Wiekter (K. C. V. C. '17) and C. H. Zink (McGill '95).

What other veterinary organization, as large or larger, can boast a 100 per cent A. V. M. A. membership?

## RETURNING THE UTERUS\*

*By E. E. BITTLES, Waterford, Pa.*

Inversion of the uterus has one nice thing about it—it is not very hard to diagnose. (Laughter.) I find in talking with different veterinarians that nearly every one has a different way of performing this operation. As I am rather noted for doing things differently from anybody else, and as those in charge of the program wanted me to talk on some cases, I thought I would try to explain to you how I return a uterus.

In the first place, when I go to the barn, I go in as quietly as possible and try to keep things quiet. I get everything ready. I put on a pair of rubber boots and a fisherman's overalls. They are large enough so you can step right in them with the rubber boots on. Well, about the first thing I do is send a man for a bucket of warm, clean water. I tell him to have it as warm as he can bear his hand in it. Then I use about an ounce and one-half of creolin to each gallon of water. I always douche the vagina after I get through, with a good strong solution.

I always get my needle and everything ready. Usually the cow is down. By the time you are ready to operate, if you will jump at the cow suddenly and yell at her, and grab her by the tail, you will get her up. I take that solution and pour it down over the uterus. I never use cotton or anything of that kind to wash it off. I just simply pour the solution over the uterus and wash off all that will wash off. Of course, if there is any straw or anything like that, I pick it off with my hand.

Then I take my fist and find one of the horns of the uterus and try it a little until I find what I think is the right place. Then I take this instrument and put this large end in where my fist is. You can push it in, you see, and put it against your breast and do your own pressing. The easiest way is to have the farmer or somebody else do the pushing. You need not be afraid. I never had it happen where they pushed it through the uterus. Then you have both hands to work with. After you get it started back about so far, then see that the other horn of the uterus is turned back and you will find that that makes the work much easier. If you take the average man, if his arms are long enough to do

\*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

that job and do it right, his hand would be dragging on the ground. (Laughter.) You will find that that is three feet long.

This is a pear, or at least that was what I told a friend of mine I wanted him to turn out. I told him to make it the shape of a pear and to make it three inches through at the thickest part. You see it is round like a ball on that end. My notion is that because this is wood, it adheres to the uterus more than if it were nickel-plated or something of that kind.

I find that when the average man goes to a job like that, he stuffs his arm in and plugs the hole and then tries to return the uterus. You would laugh at a man putting a cork in a bottle and then trying to fill it. You see this three-eighths rod does not take up any room. When you work in the business for forty years like I have, you get a little short-winded; then you can have the other fellow do the pushing. Your pay goes on just the same. (Laughter.)

If you go where there is a ewe, a sow or something of that kind, you turn to the other end and do the same job.

After I return the uterus, I always stitch the cow up thoroughly. The reason I use creolin and the suture is this: I drop that right in a clear solution of creolin and it acts as a local anesthetic. You put the uterus back and see that the horns are pushed in. If you start the second one right, you will not have any trouble, it will go back.

Before I left home I called up regarding the last three cases I operated on and they said they never saw the cow strain once after I left.

#### DISCUSSION

DR. R. R. DYKSTRA: I was wondering whether Dr. Bittles, in his cases, had ever resorted to the use of intraspinal anesthesia. We have used it quite a good deal and found it of a good deal of value in aiding replacements and, after replacements have been effected, in controlling, to a very large extent, the after-straining. We think a good deal of it. I was wondering if you had any experience with it, Dr. Bittles.

DR. BITTLES: I never really see the need of it. Most anyone can make this instrument. Of course, they are not for sale. The fellows that live near me are good fellows, so I had a few of these made and gave one to each of them. Anybody who is not mechanic enough to make one of those things is not mechanic enough to return a uterus. (Laughter.)

---

#### Why Not?

Animals swear, according to the findings of an Edinburgh University naturalist. It's only natural. Why shouldn't chickens, for instance, use fowl language?

—*Farm & Fireside*

## PATHOLOGICAL ALTERATIONS OBSERVED IN CATTLE FED ON SPECIAL RATIONS\*†

By A. L. DELEZ, *East Lansing, Michigan*

*Animal Pathology Section, Michigan Agricultural Experiment  
Station*

During the past three years the author has had the privilege of collecting some data from cattle fed on various experimental rations. These rations were specially prepared for the purpose of determining what effect the lack of certain ingredients might have on the animal body. The material studied, with the record of the rations fed, was furnished by Mr. C. F. Huffman, of the Dairy Section of the Michigan Agricultural Experiment Station, from his herd of cattle on nutritional experiments.

Mr. Huffman, in building up his herd for nutritional investigations, endeavored to select only calves from healthy dams. They were housed in a frame barn with a concrete floor and each animal was provided with an individual stall. The bedding consisted of wood shavings. Exercise was provided by allowing them the free run of a good-sized lot.

Since the beginning of the investigation a number of animals have died from various causes or have been killed. The work reported below consists of a study of the lesions observed in these cases. Material for study has been obtained from thirty cases, dating from October, 1925, to April, 1927. The ages of these animals range from newborn calves to two years, with the exception of three fetuses obtained from dams fed on these experimental rations.

In most of the cases studied postmortem examination was conducted as soon as the animal died. Material was taken at autopsy for microscopical examination. The tissues were fixed in Zenker's fluid and stained with eosin and methylene blue.

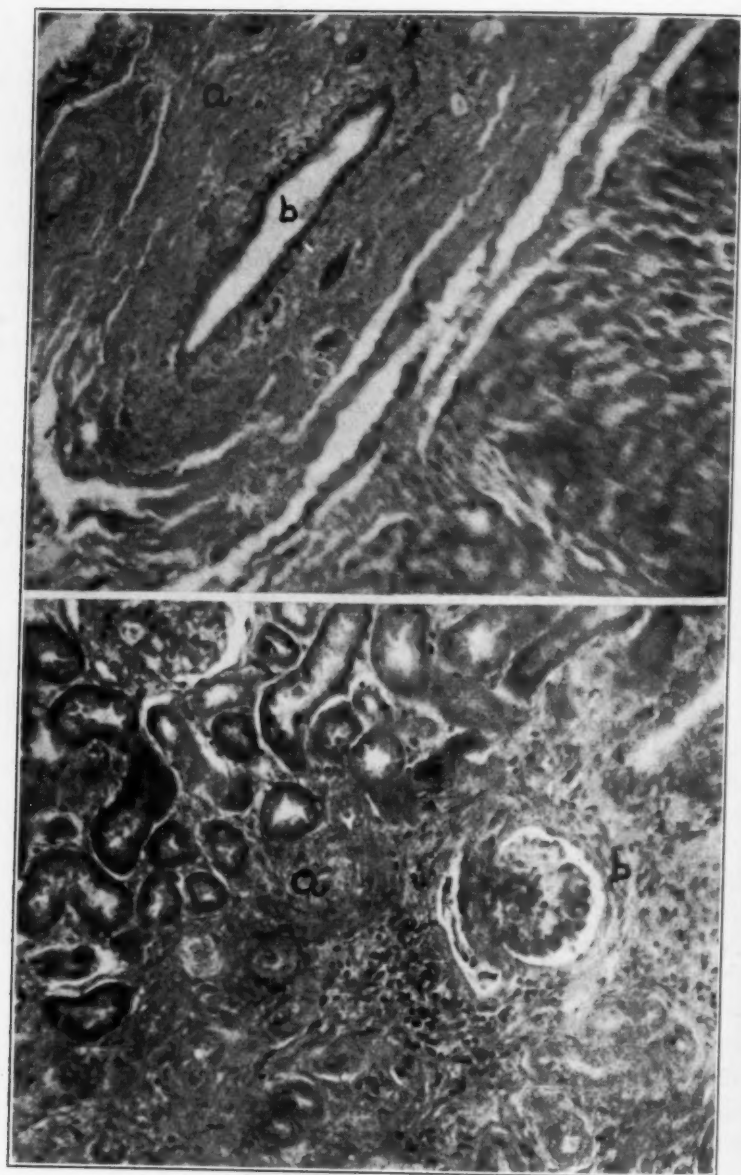
In this manuscript no effort has been made to discuss the general problem of nutrition covered by these experiments. This paper is an effort to record the pathological alterations observed in the cases available for study and to determine, if possible, whether any correlation exists between diets and lesions.

\*The subject matter of this paper is based on a thesis presented to the Faculty of the Michigan State College in partial fulfillment of the requirements for the Degree of Master of Science.

†Published with the permission of the Director of the Michigan Agricultural Experiment Station.

Received for publication, June 9, 1928.





FIGS. 1 (above) and 2 (below).



The cases have been placed in two main groups: (A) those fed on milk alone or milk with various supplements and (B) those fed on grain alone or on grain supplemented with various roughages. The various rations under each main group are as follows:

(A) Whole milk alone or milk supplemented with various supplements.

- No. 1 —Whole milk alone.
- No. 2 —Whole milk supplemented with syrup of iron phosphate.
- No. 3 —Whole milk supplemented with ferric oxid and salts of aluminum, fluorin, silicon and manganese.
- No. 4 —Whole milk supplemented with cod-liver oil and alfalfa.
- No. 5 —Skimmed milk supplemented with corn, oats and oat hulls.

(B) Grain alone or grain supplemented with various roughages.

- No. 6 —Corn, oats, and cottonseed meal.
- No. 7a—Corn and oats supplemented with timothy hay (2 lbs. daily) and raw potatoes.
- No. 7b—Corn distillers' grain, yellow corn, cottonseed meal and hominy feed supplemented with timothy hay (2 lbs. daily) and raw potatoes.
- No. 8a—Corn and oats supplemented with timothy hay (2 lbs. daily) raw potatoes and calcium carbonate (4% of ration).
- No. 8b—Corn distillers' grain, yellow corn, wheat bran and cottonseed meal supplemented with timothy hay (2 lbs. daily) and calcium carbonate (4% of ration).
- No. 9a—Corn and oats and cottonseed meal supplemented with wheat straw.
- No. 9b—Corn and oats supplemented with corn silage and wheat straw.
- No. 10 —Corn and oats supplemented with corn silage, wheat straw and magnesium phosphate.
- No. 11 —Corn distillers' grain, corn gluten and cottonseed meal supplemented with wheat straw up to nine months of age, then changed to corn and oats and cottonseed meal supplemented with corn silage and alfalfa hay.

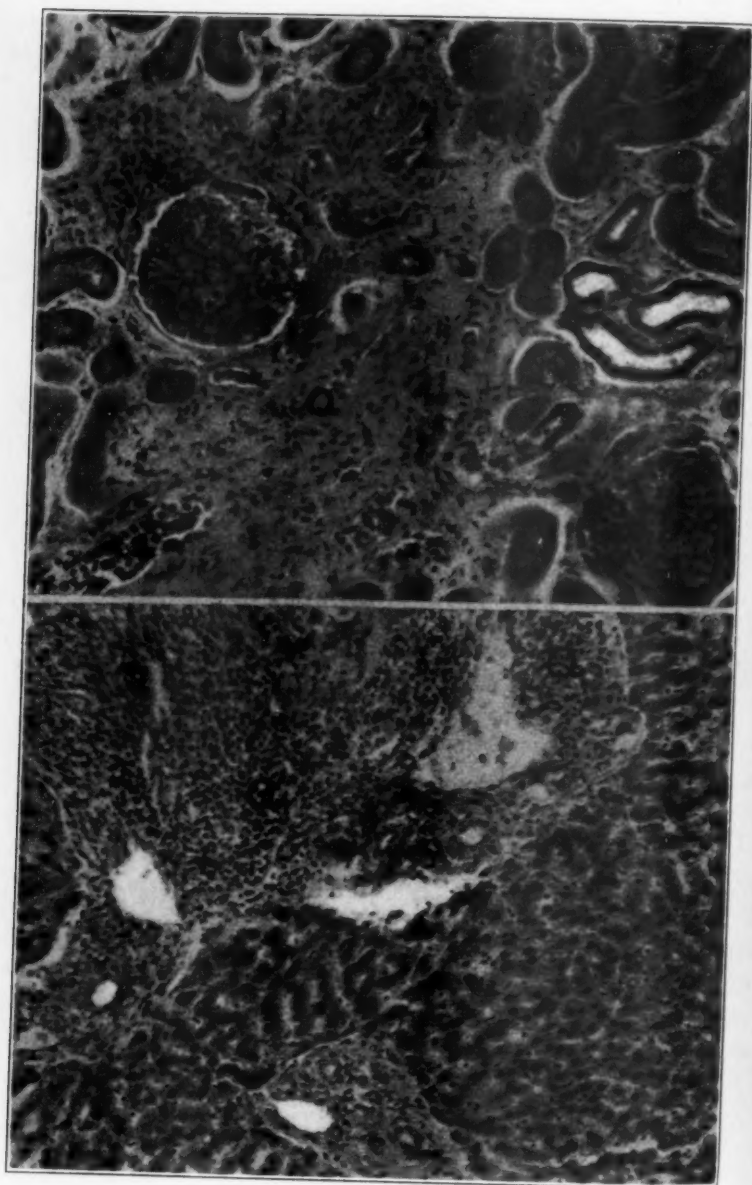
### SYMPTOMS

*Cases fed on milk alone or milk with various supplements:*

Some of the animals when fed on these rations for several months develop a roughened coat and in some instances there is emaciation. Convulsions are the outstanding symptom. Table I shows the relative number of animals on the various rations so far studied that showed convulsions.

TABLE I—*Animals showing convulsions*

| RATION | NUMBER OF ANIMALS ON RATIONS | CONVULSIONS |
|--------|------------------------------|-------------|
| 1      | 7                            | 3           |
| 2      | 4                            | 2           |
| 3      | 2                            | 1           |
| 4      | 1                            | 1           |
| 5      | 1                            | 0           |



FIGS. 3 (above) and 4 (below).

The animals frequently are in a state of vertigo, during which the muscles are relaxed. When the convulsions develop the muscles become tense; this is accompanied by dyspnea and frothing at the mouth. The attacks in some cases last two or three minutes, while in others they are intermittent and last several hours. It is observed that calves under six months survive several attacks but the older ones die when the first convulsive symptoms seize them. The more active animals bellow considerably when in convulsions. Occasionally a stiffness of the leg muscles develops which is either permanent or temporary. In some instances there is a diarrhea.

*Cases fed on grain alone or grain supplemented with various roughages:*

Most of the animals in this group are in fair condition of flesh; a few cases show emaciation. Some animals suffer from convulsions but they are not so severe as in the cases on milk rations. None of these animals have died when in convulsions. Occasionally there is blindness associated with convulsions.

#### MACROSCOPICAL CHANGES

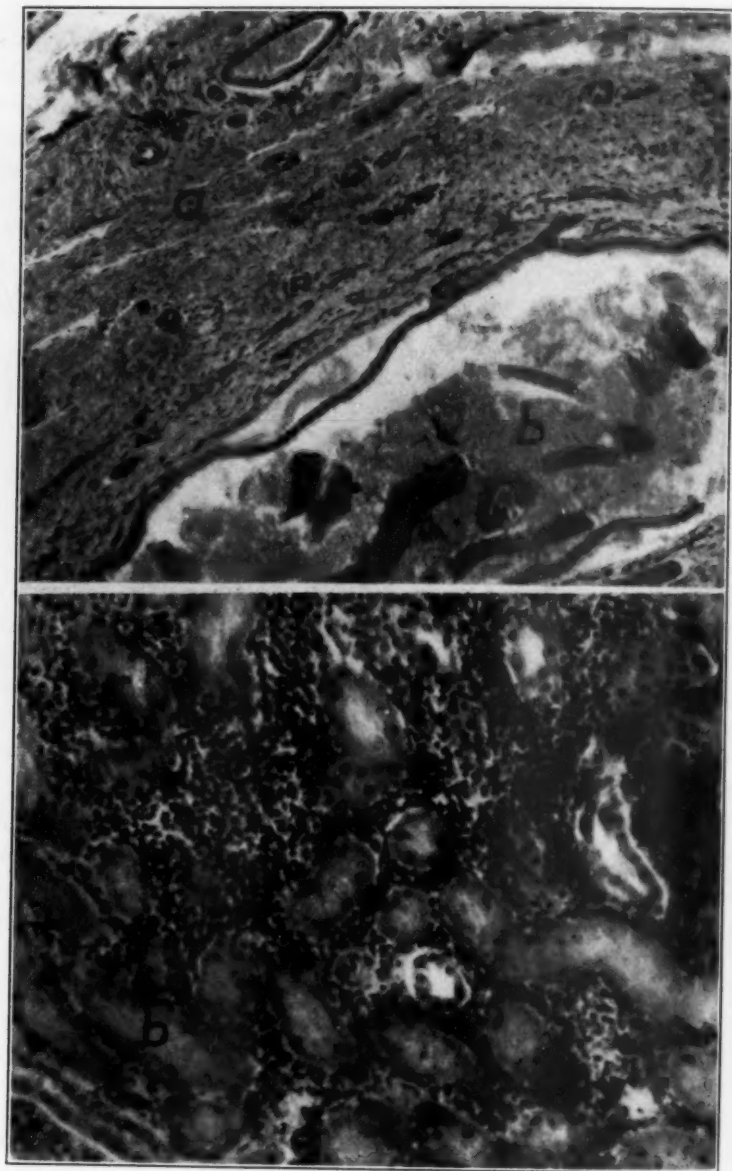
The gross lesions are much alike in the animals fed on either the milk or grain rations. Occasionally subcutaneous hemorrhages are found, while petechial and ecchymotic hemorrhages of the heart are quite frequent. In some of the milk-fed cases the thymus shows numerous petechial hemorrhages. There are four cases on milk rations in which the heart shows white plaques under the endocardium that resemble calcareous deposits.

In the liver there are fatty changes; occasionally small grayish white foci suggestive of necrobiosis, and also occasionally areas suggestive of acute hepatitis. The kidneys show congestion of the medulla especially, and this is more frequently observed in the milk-fed animals. In some cases the kidney is firm, indicating fibrosis of the organ. In other cases the kidneys show parenchymatous degeneration and also less commonly grayish foci in the cortex suggestive of leucocytic infiltration.

#### MICROSCOPICAL CHANGES

The microscopical picture is also quite similar in both types of rations outlined above.

In the milk-fed animals the grayish white plaques occurring under the endocardium are foci of hyalin necrosis. They consist of a central area of disintegrating necrotic debris with an outer



FIGS. 5 (above) and 6 (below).

hyalin zone surrounded by a fibrous tissue wall. The largest focus measures one millimeter in diameter. They protrude above the surface of the ventricular wall.

Microscopically the liver and kidneys show considerable congestion in many cases and also considerable degenerative changes. There is an increase of the connective tissue in the portal canals of the liver that is quite constant and in some instances has attained considerable proportion (figs. 1, 5 and 7). In other instances the portal canals are very cellular, being infiltrated with mononuclear cells (fig. 4).

In the kidneys the intertubular tissue is very much increased—in some cases the tissue is adult in character (fig. 2) while in others it is embryonic (fig. 3). In the latter instance the tissue is in a stage of proliferation. In some cases there is a marked lymphocytic infiltration of the intertubular tissue (fig. 6), and in others there is a mononuclear infiltration (fig. 8).

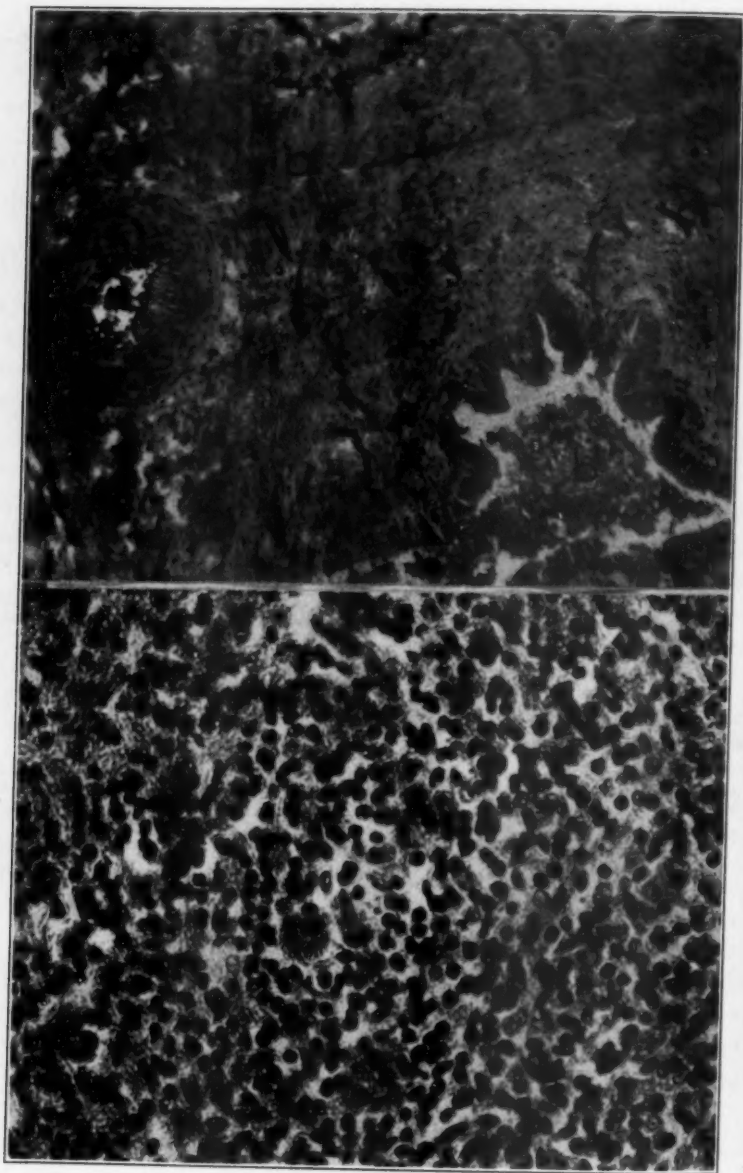
Microscopical examination of sections of the optic nerves reveals interesting changes in two cases. One case has the appearance of marked degeneration of the central portion of the nerve and close examination shows that the myelin sheaths of the nerve fibers are entirely disintegrated (fig. 10). The other case shows a marked constriction of the nerve trunk, with atrophy of the nerve fibers at the point of constriction. The constriction is 3 millimeters long and 1.5 millimeters wide and is visible on gross examination (fig. 9).

#### DISCUSSION

The interpretation of lesions observed in the animals studied in this work is a difficult matter. In the material studied one finds acute, subacute and chronic inflammatory reactions side by side. This is particularly noticeable in the kidneys where marked congestion of the medulla and cortex with extensive necrosis of the tubular epithelium is observed in connection with proliferation and fibrosis of the intertubular tissue. In the liver there are cases of marked congestion that also show fibrosis of the portal canals.

One may assume that the acute lesions may be due to a sudden release of a considerable amount of the end-products of digestion which are injurious to the cells of the liver and kidneys. Smaller amounts may be neutralized before they reach the cells and hence act only as mild irritants, or else the lesions of a subacute or chronic nature may be due to a microorganism with a low





FIGS. 7 (above) and 8 (below).



invasive power and which gains a foothold only when the resistance of the subject is lowered. The inadequacy of the ration may be the cause for the lowered resistance in some cases.

The convulsive symptoms suggest the possibility of toxic agents affecting the central nervous system. The petechial and ecchymotic hemorrhages of the pericardium and heart and occasionally of the thymus gland, particularly in the animals on milk rations, are indicative of toxic substances circulating in the blood. There are also several cases on both milk and grain rations that show marked congestion of the mucosa of the abomasum and upper intestinal tract. The presence, however, of considerable foreign material in the compartments of the stomach such as wood shavings and cinders must be considered as the most probable cause for this condition. The foreign material in the digestive tract is evidence that the animals develop a depraved appetite.

There are two animals that are blind, both of which are cases on grain rations with cottonseed meal and wheat straw. The optic nerve in each case is found to be involved. While the lesions are not identical yet they are both degenerative in nature.

#### SUMMARY

Animals fed on milk and grain rations with various supplements show lesions in the liver and kidneys that are acute, subacute and chronic in nature.

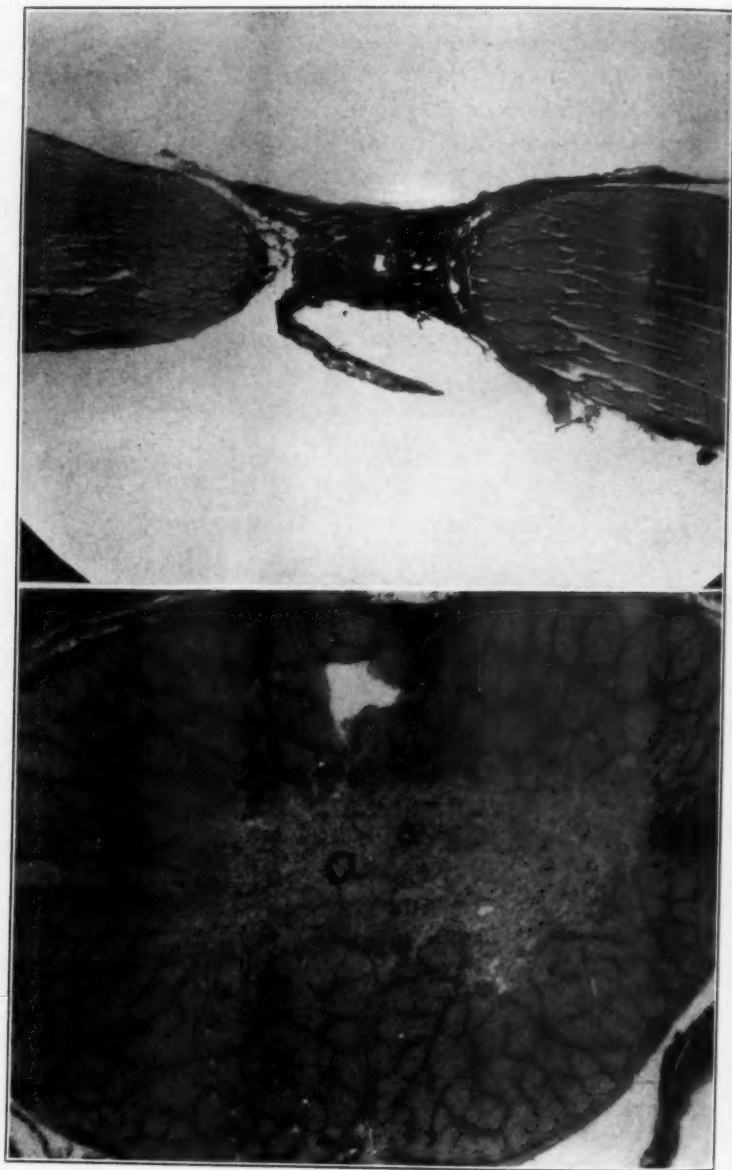
Convulsive symptoms are more violent and common in milk-fed animals.

The pathological picture in many cases indicates that death is due to acute intoxication.

Blindness is observed in two cases fed on rations of grain with cottonseed meal and wheat straw. Microscopical examination reveals definite lesions in the optic nerve of both cases.

#### ACKNOWLEDGMENTS

Grateful acknowledgment is given to Dr. E. T. Hallman for valuable assistance in studying microscopical lesions and to Dr. L. B. Sholl for assistance in the macroscopical examination of many of the cases. Also to Mr. C. F. Huffman, of the Dairy Section of the Michigan Agricultural Experiment Station, for kindly furnishing the material for this study.



FIGS. 9 (above) and 10 (below).

## INDEX TO FIGURES

- FIG. 1. Liver (Aut. 1314). Age 6 months. Whole-milk ration with no supplement. A, extensive fibrosis of portal canal; b, bile duct. x 150.
- FIG. 2. Kidney (same as fig. 1). A, thickening of intertubular tissue; b, thickening of glomerular capsule. x 150.
- FIG. 3. Kidney (Aut. 1380). Age 15 months. Whole-milk ration with no supplement. A, proliferation of intertubular tissue; b, necrotic tubules. x 150.
- FIG. 4. Liver (Aut. 1387). Age 9 months. Whole-milk ration, supplemented with various minerals, such as ferric oxid and salts of aluminum, fluorin, silicon and manganese. A, marked cellular infiltration of portal connective tissue. x 150.
- FIG. 5. Liver (same as fig. 4). A, extensive fibrosis of portal canal; b, large bile-duct showing disintegration of the mucoea. x 150.
- FIG. 6. Kidney (same as fig. 4). A, extensive lymphocytic infiltration of intertubular tissue; b, necrotic tubule. x 200.
- FIG. 7. Liver (Aut. 1355). Age 9 months. Corn and oats, cottonseed meal and wheat straw. A, extensive fibrosis of portal canal; b, bile-duct containing desquamated epithelial cells, leucocytes and debris. x 125.
- FIG. 8. Kidney (Aut. 1389). Age 11 months. Corn distillers' grain, corn gluten, cottonseed meal and wheat straw. At 9 months alfalfa hay and corn silage were added to the ration. The figure shows an area of mononuclear infiltration. x 300.
- FIG. 9. Optic nerve (same as fig. 8). A, constriction of nerve trunk with atrophy of nerve fibers at point of constriction; b, normal nerve trunk. x 10.
- FIG. 10. Optic nerve (Aut. 1350). Age 1 year. Corn and oats, cottonseed meal and wheat straw. A, disintegration of myelin sheaths of nerve fibers in center of nerve trunk; b, normal nerve fibers. x 15.

## ADENOSARCOMATA OF THE KIDNEYS OF CHICKENS

By FRANK P. MATHEWS, *Lafayette, Indiana*

*Department of Veterinary Science, Purdue University Agricultural  
Experiment Station*

Reports in the literature upon the occurrence of Wilms' tumor in the domesticated animals are scarce. Among the first is that by Johne,<sup>1</sup> of an adenorhabdomyosarcoma of the kidney of a hog. It is of interest to note that he was among the first to recognize the true histological picture of this disease. At a much later date, Day,<sup>2</sup> and, more recently, Feldman<sup>3</sup> have contributed materially to our knowledge upon the nature and occurrence of this type of neoplasm in swine, the one domesticated mammal in which its occurrence appears to be at all common. Five neoplastic cases which evidently belong to this group are reported in rabbits; two by Bell and Henrici,<sup>4</sup> and one each by Lubarsch,<sup>5</sup> Nurnberger,<sup>6</sup> and Scott.<sup>7</sup> Although this type of tumor is not of rare occurrence in chickens, it does not appear to have attracted the attention of the comparative pathologist. During a period of a little over two years, twelve cases have been observed in chickens brought to the Veterinary Department of Purdue University, for postmortem examination.

### GROSS CHARACTERISTICS

The smaller tumors are located in the anterior two-thirds of the left kidney. Those that have attained considerable size are located in the same region but occupy practically the entire space normally occupied by the kidney, and extend well into the abdominal cavity. In two cases the tumors are pedunculated masses suspended in the abdominal cavity, by a peduncle composed of serous membrane, blood-vessels, and a slight amount of connective tissue. The anatomical relations are quite significant when considering the one prominent clinical manifestation of the disease. In all cases the growth of the tumor has resulted in pressure upon the nerve supply of the left leg, causing a partial or complete paralysis of the limb.

The smallest tumor weighed 13 grams, and the largest 420 grams. In the latter case the neoplasm represented 20 per cent of the total body weight of the chicken. As a rule the shape is

---

Received for publication. August 8, 1928.

roughly oval, with a flattened surface at the point of the attachment.

The attachment consists of adhesions between the fibrous tissue portion of the capsule and the periosteum of the spinal column directly above the kidney.

A dull gray color is exhibited by most of the tumors, but the color is modified by hemorrhage and cavernous blood-vessels in two cases.

A well-defined capsule containing a few conspicuous blood-vessels is present in all cases. The outer part of the capsule is composed of a serous membrane which is continuous with that of the kidney and other abdominal serosa. The remainder of



FIG. 1. Case 19. A well-advanced case. The tumor was attached to the left of the median line, but had grown towards the right side of the abdominal cavity.

the capsule is composed of connective tissue and surrounds the growth, thus separating the tumor from such portions of normal kidney as may still exist. Cross sections show the tumors to be divided into lobules by trabeculae which originate from the connective tissue capsule.

Each lobule contains many cysts which are quite variable in size. There is a lack of uniformity in the nature of the cystic contents; in some the cysts are filled with a thin, milky or amber-colored fluid; in others the contents are more gelatinous in nature. In some cases small, yellowish areas of necrosis are present.



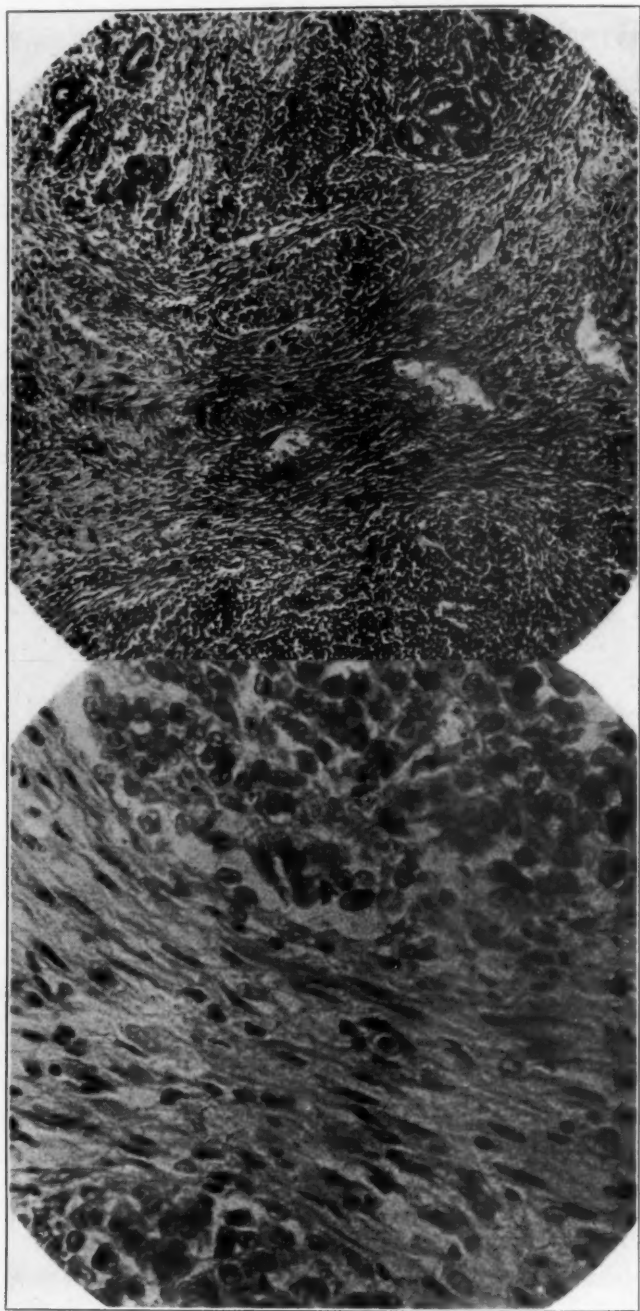


FIG. 2. The microscopic appearance of case 19, showing many epithelial structures supported by an abundant, spindle-cell stroma.

FIG. 3. A higher magnification of fig. 2.

Secondary tumors were found in the muscle of the left thigh, the left lung, and the posterior pole of the right kidney of one case (212).

#### HISTOPATHOLOGY

A microscopic study shows that all the tumors are made up of epithelium, and a connective tissue stroma which is quite different from the stroma commonly encountered in adenocarcinoma. The ratio of stroma to epithelium is quite variable. In some fields the stroma is the predominating picture, in others the histology is that of an adenocarcinoma. Three of the cases present some distinctive features which are worthy of special consideration. The remaining nine present a histopathology which is readily embodied in a single description (figs. 1, 2 and 3).

The type of epithelium varies from low cuboidal to high columnar. The nuclei are hyperchromatic and occupy a large part of the cellular space. Cells showing mitotic division are frequently seen. The cellular arrangement is quite irregular. Large, compact masses of epithelium having no definite arrangement are abundant. Separated from such structures by a variable amount of stroma may be found tubular and alveolar-like structures lined by a single layer of cells. Frequently, the epithelium of the latter structures rests upon an imperfect basement membrane. Many of the cells show a fatty infiltrative degeneration. Cystic spaces surrounded by a single layer of flattened epithelium are abundant. The cystic contents do not exhibit a uniform staining reaction to hematoxylin-eosin. In some cases it takes a light blue stain, in others a uniform pink, and in some there is a mixture of the two colors. Some of the smaller, tubular-like structures contain masses of deep pink-staining material resembling the hyalin cast of the kidney tubule. Keratohyalin is observed in two cases (fig. 8).

The connective tissue element in nine of the tumors is spindle-cell in type and quite cellular. The nuclei are cigar-shaped with rather blunt ends and hyperchromatic. Mitotic figures are occasionally seen. The intercellular substance consists of long wavy fibrillae which give the connective tissue reaction when stained by Van Gieson's method. Smooth muscle cells are common throughout the stroma of some of the tumors; in others, this type of cell is not encountered. Blood-vessels are frequently seen but they are not numerous. Muroid degeneration of the stroma is of common occurrence. In one case this change had

progressed to the extent of giving the appearance of a mucoid carcinoma, in that some fields showed clumps of epithelium entirely surrounded by a mucoid substance.

Two cases showed the general histology of this class of tumors, but presented a stroma which was more cellular and of a slightly different type than the stroma previously described. The nuclei stained intensely, were oval to slightly elongated and centrally located in a well-defined cytoplasm. In loosely arranged fields the cells were distinctly spindle-shaped. Fibrillae were not observed and, when stained by Van Gieson's method, the cytoplasm took a homogenous lavender stain. This sarcomatous stroma supported the endothelium of many cavernous blood-vessels (fig. 4). Large areas showing extravasated blood were

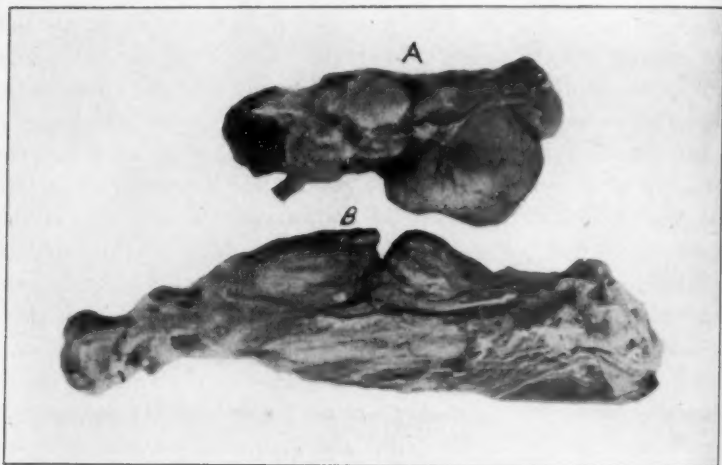


FIG. 5. Case 212. The primary tumor (A) and a secondary tumor in the left thigh muscle (B).

numerous. The epithelium resembled that of the other tumors except that it was more uniformly columnar in type, and more orderly in its distribution.

Case 212 (figs. 5 and 6) was of particular interest as it was the one case in which metastasis had occurred. The primary tumor in the left kidney was roughly divided into lobes, otherwise, its gross appearance was quite characteristic. Necrotic areas were numerous in both the primary and secondary tumors. Microscopically, the primary tumor differed from those previously described in that the sarcomatous element predominated the picture in every section. The characteristic epithelial elements were present, but in all cases they were widely separated by a

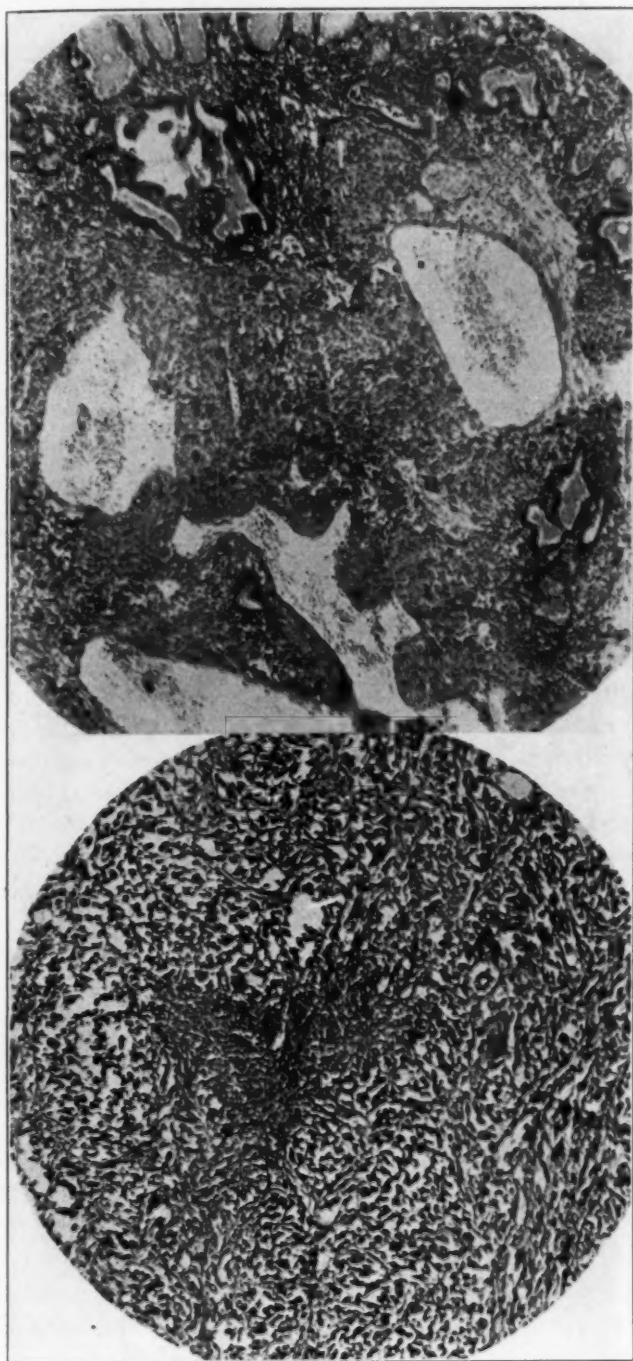


Fig. 4. Case 194, showing cystic spaces, and a sarcomatous stroma supporting the endothelium of cavernous blood-vessels.

Fig. 6. The microscopic appearance of case 212, showing the predominant sarcomatous element and one degenerated tubular-like structure (A).

stroma which presented the picture of a rapidly-growing sarcoma. The stroma was composed of bundles of spindle-cells which had been cut in various planes. The nuclei were plump, hyperchromatic, and mitotic figures were abundant. Multinucleated giant cells were frequently seen. There was an inadequate blood supply and necrotic areas were very common. The secondary tumors presented the same picture of a rapidly-growing spindle-cell sarcoma. There was, however, no evidence of epithelium in the secondary neoplasms. It is evident that in this case there had been a metastasis of the sarcomatous element, only. Day<sup>2</sup> reported two cases of metastasis in swine, but in both cases the metastatic tumors presented much the same picture as that of the primary growth.

#### DISCUSSION

The twelve cases herein reported have been encountered during the routine autopsies upon approximately 2000 birds, which is an incidence of 0.6 per cent. The majority of the cases have been found in Barred Rocks, a condition which is not surprising since observations over a period of years have shown that this breed is especially predisposed to malignant tumors in general. The twelve cases were about equally divided between males and females, in which respect there is a close agreement with the occurrence of this type of neoplasm in mammals. The occurrence as to age is only approximate since in some cases this factor could not be exactly determined. The ages varied from three months to two years, a minimum and maximum which is known to be correct in both cases. Nine (66%) of the cases occurred in birds which were 9 to 24 months of age before symptoms of the disease were noted. Judging from these observations and from the literature which is available, the symptoms of the disease are not manifested in the domesticated animals until after the age of sexual maturity.

Obviously these tumors are of no economic importance to the poultry breeder. However, they are of more than passing interest to the pathologist from the standpoint of histogenesis. The constant location of the neoplasm adjacent to the left kidney of the chicken is in contrast to its location in mammals, for according to the authors previously cited one kidney is involved about as often as the other in both swine and rabbits and, according to Hinman and Kutzmann,<sup>8</sup> the same condition obtains in children. The origin of these tumors is an interesting



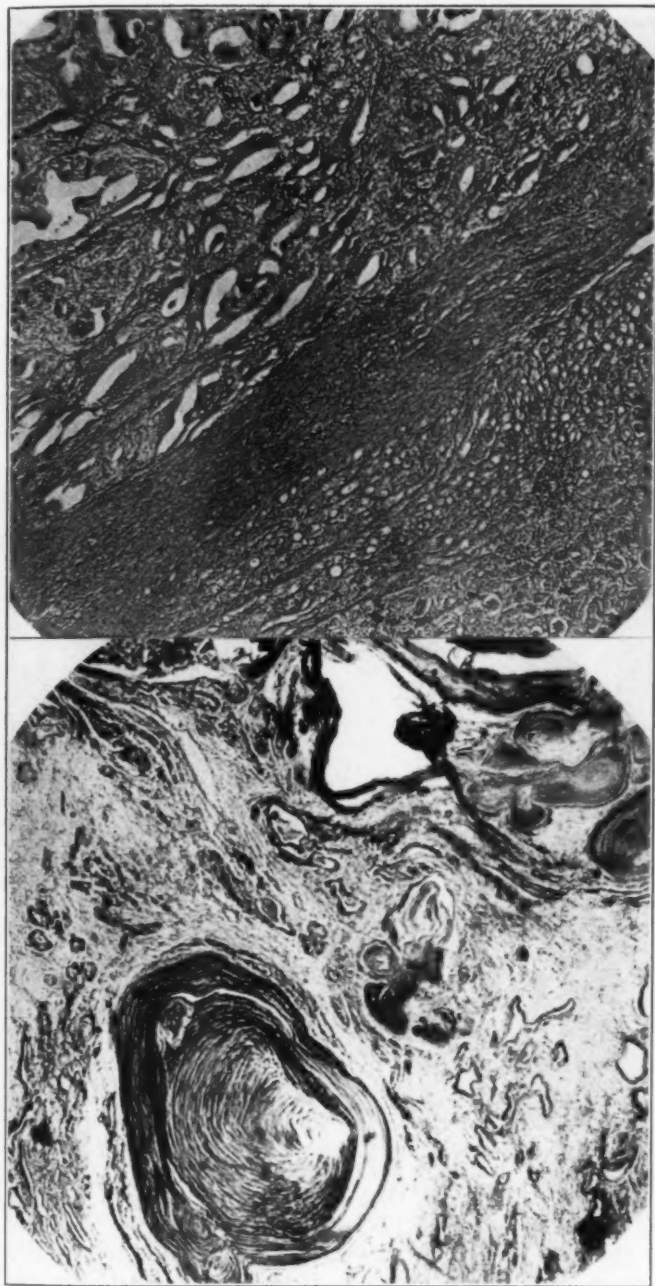


FIG. 7. Case 199, showing a connective tissue capsule separating the kidney from the tumor, which in this field is principally adenocarcinomatous.

FIG. 8. Case 173. Keratohyalin and adenomatous structures supported by a fibrous stroma.



and open question. Feldman<sup>3</sup> has found some of them to be located adjacent to, but not involving, the kidney. The fact that in chickens these tumors are attached to the spinal column, dorsal to the kidney, and that they are separated from the kidney by a fibrous tissue capsule, suggests that they are all non-nephrogenic, but due to anatomical relations, they are forced to grow towards the abdominal cavity through a previously normal kidney. If such is the case, there may be some connection between the origin of these tumors and the early development of the reproductive organs, since in the fowl the left ovary and oviduct remain functional.

### SUMMARY

A study of twelve renal tumors in chickens has been made. These tumors were found to belong in the class known as adenocarcinoma, Wilm's tumor, mixed renal tumors, etc.

TABLE I—*Clinical data*

| CASE NUMBER | AGE IN MONTHS | SEX | BREED         |
|-------------|---------------|-----|---------------|
| 19          | 9             | M   | Barred Rock   |
| 20          | 9             | M   | Barred Rock   |
| 23          | 10            | F   | Barred Rock   |
| 86          | 24            | F   | Barred Rock   |
| 135         | 24            | F   | Barred Rock   |
| 173         | 10            | F   | Barred Rock   |
| 199         | 3             | M   | Barred Rock   |
| 200         | 5             | F   | Barred Rock   |
| 201         | 3             | M   | Barred Rock   |
| 212         | 24+           | M   | Barred Rock   |
| 194         | 12            | F   | White Leghorn |
| 222         | 8             | F   | White Leghorn |

The primary growth was located in the region of the left kidney in all cases.

In one case metastatic tumors were found in the muscles of the left thigh, the left lung and the right kidney.

### ACKNOWLEDGMENT

The writer is indebted to Dr. F. L. Walkey for collecting most of the cases herein reported.

### REFERENCES

- <sup>1</sup>Johns: Cited by Goldberger: Jour. A. V. M. A., lviii (1920), n. s. 11 (1), p. 47.
- <sup>2</sup>Day, L. E.: 24th Ann. Rept., B. A. I., 1907, p. 247.
- <sup>3</sup>Feldman, W. H.: Amer. Jour. Path., iv (1928), p. 125.
- <sup>4</sup>Bell, E. T., & Henrici, A. T.: Jour. Can. Res., i (1916), p. 157.
- <sup>5</sup>Lubarsch, O.: Centr. f. allg. Path., xvi (1905), p. 342.
- <sup>6</sup>Nurnberger, L.: Beiträge zur Path. Anat., U. allg. Path., lii (1912), p. 523.
- <sup>7</sup>Scott, E.: Jour. Can. Res., ii (1917), p. 367.
- <sup>8</sup>Chinman, F., & Kutzmann, A. A.: Ann. Surg., lxxx (1924), p. 560.

## CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

### HEMATOMA OF THE OVARY OF A COW

By L. B. SHOLL, *East Lansing, Mich.*

*Department of Animal Pathology, Michigan State College*

On May 22, 1928, a specimen from a cow was received by the laboratory for examination. There was history of manipulation of the ovary previous to pregnancy. The animal was bred on November 18, 1927, and conceived at the first service. She be-



FIG. 1. Hematoma of ovary of cow.

came a positive reactor to the tuberculin test, and was slaughtered during the sixth month of pregnancy.

The ovary is normal in appearance, and contains what appears to be a normal corpus luteum of pregnancy. Attached to the free

surface of the corpus luteum at about its center is a fibrous cord, twisted in appearance, about 2 mm. in diameter, and about 9 cm. long. At the end of this cord is a light brown, rather firm, encapsulated structure, rather rectangular in shape, 3.5 by 5 cm. on the flat surface and about 2 cm. thick. On section, this mass has a somewhat lobulated, light grayish-brown appearance.

On gross examination it has the appearance of a hematoma. Histological examination demonstrates the mass to be a hematoma.

This is thought to be the result of hemorrhage occurring shortly after ovulation, after the ovarian capsule had grown over the point of rupture. It is thought probable that stretching and twisting of the capsule resulted in the formation of the cord-like attachment. Such a structure, if discovered during clinical examination of a cow per rectum, might prove rather confusing to the practitioner.

### ECTOPIA CORDIS

*By G. A. HANDLEY, Ironton, Ohio*

The accompanying photograph shows a two-weeks-old calf, owned by Mr. A. C. Edwards, of Proctorville, Ohio. When the picture was taken, the calf was in good condition in all respects, except that the heart was located on the inferior part of the neck, just anterior to the sternum. Immediately after birth, the heart



FIG. 1. Ectopia cordis in a calf. (Arrow points to heart.)

could be moved up the neck as far as the angle of the jaw, but at two weeks of age adhesions had formed and the heart was firmly attached to the skin and surrounding tissues.

### AN INTERESTING FAMILY

In the accompanying photograph are shown the members of a rather unusual family group, a female mule, her colt and the father of the colt. The photograph was forwarded by Dr.



FIG. 1. An unusual family.

Adolph Eichhorn, Director, Veterinary Department, Lederle Antitoxin Laboratories, who, in turn, received it from Dr. Guillermo Moreno, of Huelva, Spain. Dr. Moreno was in attendance at the accouchement.

### Chivalry Misplaced

The train robber was holding up a Pullman car: "I'll kill all men without money and kiss all women."

An elderly gent said: "You shall not touch these ladies!"

An old maid in an upper berth shouted:

"You leave him alone; he's robbing this train."

—*Pharmaceutical Advance*

## ARMY VETERINARY SERVICE

### CHANGES RELATIVE TO VETERINARY OFFICERS

#### Regular Army

The promotion of 2d Lieut. Lewis E. Schweizer to grade of 1st Lieutenant is announced, effective October 27, 1928.

Captain Lloyd C. Ewen is relieved from assignment and duty in the Panama Canal Department and assigned to duty at Ft. Hoyle, Md., and upon arrival in the United States will proceed to Washington, D. C., and report to the commanding officer, Walter Reed General Hospital, for observation and treatment.

Captain Joseph H. Dornblaser is relieved from assignment and duty at the Presidio of Monterey, Calif., and will proceed at the proper time to San Francisco, Calif., and sail on the transport scheduled to leave that port on or about December 22, 1928, for the Canal Zone.

The promotion of Major Herbert S. Williams and Major Alfred L. Mason to the grade of lieutenant colonel is announced, effective November 9 and 13, 1928, respectively.

So much of War Department orders dated June 2, 1928, as assigns Major Daniel B. Leininger to duty at Ft. Bliss, Texas, is amended, so as to assign him to duty at the Presidio of Monterey, Calif., upon completion of his present tour of foreign service.

#### Reserve Corps

##### *New Acceptances:*

Doty, Clait Jennings ..... 2nd Lt.. Valparaiso, Nebr.  
Wilkinson, Raymond James.. 1st Lt.. 455 Ellicott St., Buffalo, N. Y.

##### *Promotions*

O'Reilly, Thomas, to ..... Captain. 411 Anderson Bldg., Fort Worth, Tex.  
Hartke, George Bernard, to.. Captain. 820 Findlay St., Cincinnati, Ohio  
Nichols, Theo. Earl, to ..... 1st Lt.. 829 Whittier St., Columbus, Ohio  
Shipley, Michael to ..... 1st Lt.. P. O. Box 311, Phoenix, Ariz.

##### *Separations*

Marsh, Hadleigh ..... Major... Hon. discharged Oct. 23, 1928.  
Sarde, Robert Miles ..... Captain. Resigned Nov 3, 1928.  
Speer, Fred ..... Captain. Declined reappointment.  
Sewell, Robert Henry ..... Captain. Failed to accept reappointment.  
Schultz, Gordon ..... Captain. Failed to accept reappointment.  
Fishback, Howard Burns ..... 1st Lt.. Failed to accept reappointment.  
Nash, Edward Cassius ..... 1st Lt.. Declined reappointment.  
Chapman, Wm. Bryant ..... 2nd Lt.. Appointment terminated.  
Clark, James P. .... 2nd Lt.. Appointment terminated.  
Klug, John Henry ..... 2nd Lt.. Declined reappointment.  
Marquardt, Emmett Hugo. 2nd Lt.. Declined reappointment.  
Turner, Amos Alfred ..... 2nd Lt.. Appointment terminated.

### STATE BOARD EXAMINATION

Arkansas Veterinary Examining Board. Office of State Veterinarian, Old State House, Little Rock, Ark. January 25, 1929.

Dr. J. H. Bux, Secretary, Old State House, Little Rock, Ark.



## MISCELLANEOUS

### NORTH CAROLINA FIRST STATE TO COMPLETE TUBERCULIN-TESTING OF ALL CATTLE

Completing the tuberculin testing of all cattle in the last four of its 100 counties early this month, North Carolina has won the distinction of being the first state to have 100 per cent of its counties classes as "modified accredited areas" in the national campaign for the eradication of bovine tuberculosis, it was announced recently by the U. S. Department of Agriculture.

A "modified accredited area" is one in which official testing has shown that not more than one-half of one per cent of the cattle are tuberculous, and from which all animals reacting to the test have been removed for slaughter.

That an entire state should achieve this goal within a decade speaks well for the soundness of the area plan and for the efficiency of the work and, in the opinion of Dr. A. E. Wight, chief of the Tuberculosis Eradication Division, should be encouraging not only to all officials but to all live stock interests throughout the country.

Following close on the heels of North Carolina is Maine, he says, where thirteen of the sixteen counties are already listed as modified accredited areas. The rate of progress in that state indicates that it will be 100 per cent "clean" next year. Since the campaign was inaugurated in 1917, the degree of infection throughout the United States has been reduced from 4 per cent to 2 per cent, and a total of 581 counties and 21 townships scattered throughout 11 states have been placed on the "modified accredited" list.

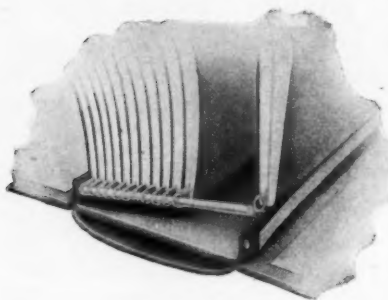
Credit for the notable achievement in North Carolina is due in a large measure, says Dr. Wight, to the continuous efforts of two men—Dr. William Moore, state veterinarian, and Dr. W. C. Dendinger, B. A. I. inspector in charge of the campaign in that state. The progressive attitude of the live stock interests and others was another important factor, he said, in placing the state at the head of the list of tuberculosis-free areas. It was one of the first states to eradicate the Texas fever tick and to be released from quarantine on account of that pest, and now it stands as the only state in the United States to be officially declared practically free from bovine tuberculosis as well.

It is true, he says, that the degree of tuberculosis infection in the counties of North Carolina was slight, making it possible to proceed with the work more rapidly than in sections where the disease is more widespread. In the course of the testing work twelve counties proved to be entirely free of tuberculous cattle, but this could not be known until all cattle had received the tuberculin test. Approximately 600,000 cattle were tested during the campaign in the State. Of this number 3,877 (0.6%) were found to be tuberculous. Many of these reactors were removed years ago, and the herds in which they were located have been maintained since in a healthy status.

State and Federal governments paid jointly to the farmers as compensation for tuberculous cattle condemned approximately \$150,000. The expenses of the operation of the work were divided among the counties, the State and the federal government. It will be possible to reduce the operating expenses in connection with this project in North Carolina considerably in the future, but a sufficient force of veterinarians will be maintained to look after the necessary retests, and every precaution will be taken to prevent the reinfection of any of the areas.

The next International Veterinary Congress will be held in London, England, August 4-9, 1930.

### How Many Binders Do You Want?



Detail of binder

The attention of JOURNAL readers is again directed to the binder described in the December issue (p. 5). A very encouraging response has been received from our members, but the number of binders tentatively ordered is hardly large enough to warrant us placing an order for the large quantity that is necessary to get the low price. You can help by dropping a postal card and saying you are interested. See the announcement made last month for further particulars.

No, Maude, dear, a canine specialist is not a four-legged animal, but a veterinarian who prefers to be known as a specialist in diseases of the dog.

## ASSOCIATION MEETINGS

---

### PENNSYLVANIA STATE VETERINARY MEDICAL ASSOCIATION

The forty-sixth annual meeting of the Pennsylvania State Veterinary Medical Association was called to order at 1:00 p. m., October 23, 1928, by Vice-President Walter G. White, of Lansdowne, Pa.

The meeting was held in the laboratory of the Pennsylvania Bureau of Animal Industry, at Harrisburg, Pa., which is located on the State Farm on the outskirts of the City. The building is of brick construction built in the form of a T. It is well lighted and equipped with modern instruments. It has about everything necessary for efficient laboratory work of all kinds.

An address of welcome was delivered by Dr. T. E. Munce, director of the Pennsylvania Bureau of Animal Industry and president of the American Veterinary Medical Association. Dr. Louis A. Klein, dean of the School of Veterinary Medicine, University of Pennsylvania, was the next speaker and he was followed by Dr. C. J. Marshall, professor of medicine in the same school. These speakers reviewed the history of the development of the laboratory from its beginning. It was first established by Dr. Leonard Pearson in a room over the blacksmith's shop in the old University of Pennsylvania Veterinary Department. A year later, Dr. M. P. Ravenel was made Director. It was then moved to the Pepper Clinical Laboratory, which is connected with the Medical School of the University of Pennsylvania. The following men in the order named have been directors of the laboratory: Drs. M. P. Ravenel, S. H. Gilliland, John Reichel, K. F. Meyer, James B. Hardenbergh, Frederick Boerner, M. F. Barnes, E. L. Stubbs, and M. F. Barnes, the present director.

The reports of the committees were next presented. This required the balance of the afternoon.

The evening program was devoted to small-animal practice. Dr. Raymond J. Garbutt, of New York City, delivered an interesting address on canine surgery and showed quite a number of stereopticon X-ray pictures. Dr. W. J. Lentz, professor of anatomy and director of the Small Animal Clinic at the School of Veterinary Medicine, U. of P., gave an address on observa-

tions in small-animal practice. He reported a new method of performing cesarean section. He also spoke on the subject of feeding small animals.

On the following morning, Hon. R. G. Bressler, deputy secretary of the Pennsylvania Department of Agriculture, Harrisburg, addressed the meeting. He reviewed some phases in the development of agriculture and veterinary medicine, which was interesting to all.

Next on the program came Dr. T. H. Ferguson, of Lake Geneva, Wis., who addressed the meeting on the subject of "Common Diseases Met with in Practice." He held the closest attention of the members by his interesting discussion. It is certain that those who heard him took away with them many helpful hints that can be used in their everyday practice.

In the afternoon, Dr. E. L. Stubbs, assistant professor of pathology at the School of Veterinary Medicine, U. of P., gave an account of his trip to Europe, with special reference to the information he gathered on poultry diseases. Dr. H. W. Turner then presented a paper on sheep diseases and demonstrated methods of administering medicine to sheep and swine. Dr. M. F. Barnes was the last on the program, with an address and laboratory demonstrations.

The members then made a tour of inspection of the farm. They visited the buildings and saw the animals used in various experiments; saw how they were being cared for and managed, etc.

The following officers were elected for the ensuing year: President, Dr. T. D. James, Scranton; 1st vice-president, Dr. Walter G. White, Lansdowne; 2nd vice-president, Dr. H. W. Barnard, Lancaster; corresponding secretary, Dr. H. R. Church, Harrisburg; recording secretary, Dr. G. A. Dick, Philadelphia; treasurer, Dr. D. R. Kohler, Boyertown; trustees: Dr. W. A. Haines, Bristol; Dr. Harry B. Mitchell, Lancaster; Dr. C. P. Bishop, Sunbury; Dr. W. H. Ivens, Philadelphia; and Dr. M. B. Herron, Canonsburg.

Fifteen veterinarians were elected to active membership in the Association and Dr. B. C. McLean, of Aiken, S. C., was elected a corresponding member.

The following were made life members, because of twenty-five years of continuous membership in good standing: Drs. N. H. Allis, H. B. Cox, M. A. Davies, S. H. Gilliland, A. R. Potteiger, John P. Stover, Louis A. Klein, W. M. Wilson,

Joseph Johnson, S. W. Mathues, D. A. Gorman, Thomas S. Carlisle, Ernest L. Cornman, Frank U. Fernsler, Willis D. Fuller, Jacob E. Strickler, Ezra W. Newcomer and W. H. Mattson.

G. A. DICK, *Recording Secretary*.

## PURDUE UNIVERSITY VETERINARY SHORT COURSE

Sixty veterinarians attended the Veterinary Short Course at Purdue University, October 30 to November 2, 1928. The course opened with a poultry disease clinic which was conducted by members of the staff of the Veterinary Department. At an evening session of the first day, Drs. F. H. Brown and J. E. Gibson discussed problems in the control of animal diseases.

During the morning of the second day, Prof. J. H. Hilton, of the Purdue Dairy Department, discussed the feeding and managing of the dairy herd; and Dr. W. L. Boyd, of the University of Minnesota, gave an illustrated lecture on the cause of sterility in the cow. Dr. Boyd's illustrations and descriptions were presented in such an excellent way as to give a clear understanding of the common causes of sterility.

During the afternoon meeting, Dr. G. H. Roberts demonstrated methods of collecting blood from cows for serological tests; and Dr. Boyd demonstrated the methods of diagnosing and treating sterility in the cow.

The forenoon of the following day was devoted to a continuation of the cattle clinic by Dr. Boyd. During the afternoon, there was a postmortem examination of the sterile cows which had been used in the clinic; and also a demonstration of anemia in pigs. In the evening there was a banquet at the Purdue Memorial Union Building. Dean J. H. Skinner spoke at the banquet, calling attention to the changing conditions in agriculture and the effects on veterinary practice.

Dr. E. K. Sales, of Michigan State College, conducted a small-animal clinic during the last morning of the course. During this clinic, Dr. Sales demonstrated methods of performing surgical operations on cats and dogs. He also gave an excellent discussion of the general principles which apply to small-animal practice.

R. A. C.



### VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was held at the Academy of Medicine Building, 103rd St. & 5th Ave., New York City on Wednesday evening, November 7, 1928. Dr. Rohrer being absent, the chair was occupied by Dr. O. E. McKim, vice-president.

Dr. Wilfred Lellmann gave us a talk on "Essentials of Life as Applied to the Whole Animal Kingdom." Dr. Lellman explained principally the importance of calcium salts and that their absolute necessity to sustain life was demonstrated. He cited many cases in his human practice, showing the beneficial results obtained by the use of calcium salts. He also stressed the importance of dietetics with medicine as a preventive and a cure for disease conditions.

Dr. Lellmann's talk was very beneficial to the veterinarians, both for the care of their own health and the care of the animal. The Association is fortunate to be able to have the research or scientific man explain first-hand such work as he has carried out. They would not have the time or opportunity to do it. Dr. Lellmann was unable to answer questions in discussion, since he had another appointment but he promised to come again. A rising vote of thanks was extended to Dr. Lellmann by the Association for his interesting talk.

There were a number of case reports which were discussed quite freely by the Association. One, in particular, by Dr. E. R. Cushing, of New Brunswick, N. J., who reported a herd of twenty-three dairy cattle taking sick very suddenly and at the end of forty-eight hours eighteen of them had died. Postmortem and chemical examinations showed no definite clew to the cause. The only history Dr. Cushing had was that the cattle had been turned into a corn-field from which the corn had been harvested. We hope to hear from Dr. Cushing later as to the definite cause, since it is a very interesting case.

Dr. Robert S. MacKellar reported a case of dyspnea in a horse due to calcification of the rings of the trachea.

Under new business, Dr. Chase moved that the Secretary write the Commissioner of Health of the State of New York requesting information regarding the decision of the Special Committee appointed at the time of the Rabies Conference last year to investigate and report as to the efficacy and advisability of the use of antirabic inoculations as a preventive measure.

C. P. ZEPP, *Secretary.*

## MASSACHUSETTS VETERINARY ASSOCIATION

One of the largest and best meetings ever staged by the Massachusetts Veterinary Association was held in Boston, November 14, 1928. It was the occasion of a visit from Dr. T. E. Munce, president of the American Veterinary Medical Association.

Starting at two o'clock, a clinic was held at F. H. Osgood Company's hospital, Village Street. Many will recall this as the old Harvard Veterinary College Hospital. It is now operated by Drs. Charles and Herman Delano. The Association was fortunate in being able to procure Dr. J. N. Frost, of Cornell University, who performed a number of operations on large animals. Dr. B. S. Killian, of Somerville, and Dr. Hugh F. Dailey, of Boston, performed a number of operations on small animals. The new radio knife was demonstrated by Dr. Dailey. Other veterinarians present discussed clinical cases, demonstrated, microscopically, internal and external parasitisms and in general helped to make the clinic the most interesting and instructive ever held in New England.

Following the clinic a banquet was held at the Elks Hotel. About 65 were present. Business was dispensed with and the President, Dr. F. H. Bradley, of Plymouth, called upon Dr. T. E. Munce, president of the A. V. M. A., for the address of the evening. Dr. Munce, in his usual forceful manner, held the close attention of his audience for about an hour. After briefly reviewing the history of the A. V. M. A., Dr. Munce pointed out a few of the many things which this organization has accomplished for the veterinary profession and for the individual veterinarian. He led up to the duty of state associations and individual veterinarians in supporting the A. V. M. A. in its great work.

Following Dr. Munce's address, the President called upon Dr. J. N. Frost for a few remarks. Other speakers were Dr. Edward Laitinen, Hartford, Conn.; Dr. J. S. Barber, Central Falls, R. I.; Dr. F. L. Russell, Orono, Maine; Dr. R. W. Smith, state veterinarian of New Hampshire; Dr. E. H. Bancroft, Barre, Vermont; and others.

Every veterinarian present felt that much benefit had been derived from both the clinic and meeting.

HARRY W. JAKEMAN, *Secretary.*

### HUDSON VALLEY VETERINARY MEDICAL SOCIETY

The regular quarterly meeting of the Hudson Valley Veterinary Medical Society was held at the Nelson House, Poughkeepsie, N. Y., November 14, 1928. After a luncheon attended by about thirty members and their families, the meeting convened, with President John McCartney in the chair.

This being the annual business meeting, no formal program was presented, but a large number of case reports were discussed by those present and much interest was shown. The election of officers for the ensuing year resulted in the election of Dr. Wm. Henry Kelly, Albany, N. Y., president; Dr. I. O. Denman, Middletown, N. Y., vice-president; Dr. J. G. Wills, Albany, N. Y., secretary-treasurer.

---

### MISSOURI VALLEY VETERINARY ASSOCIATION

The thirty-fifth annual meeting of the Missouri Valley Veterinary Association was held at the Kansas City Athletic Club, Kansas City, November 20-22, 1928, which was during the time of the American Royal Live Stock Show. It was hoped that this would be an added attraction to Kansas City and that holding the meeting at this time, in place of the summer, would be beneficial from the standpoint of attendance. However, due to heavy floods in Missouri and Kansas, only one highway from each state was open and many railroads were forced to detour because of wash-outs; so it was not a fair trial with these conditions to meet. In spite of these handicaps, the attendance registered approximately 200, including the ladies, which is the usual number in attendance at our meetings in recent years. With favorable conditions, this probably would have been a very much larger meeting than ordinarily.

The records show there were 190 members paid up to July 1, 1928, and, with those who attend only every other year, when the Association meets in the northern or southern part of the Missouri Valley territory alternately, the present membership has reached an average during recent years of about 250. Many old members who dropped out, when it was thought that the Association would disband a few years ago, are again being reinstated and new members are also being added, although the membership can not hope to be so large as at the time the large number of recent graduates of a few years back could be counted upon to swell the list and make up for those who dropped out. With

programs of high class and well worth the time and expense of members to attend, and with a feeling of stability and confidence, the Association is maintaining a good standing favorably comparable with other veterinary associations in the Missouri Valley territory.

The Association is maintained entirely on a self-supporting basis and stands on its own merits. Since the 1926 meeting, registration has been required and members have been asked to pay up their dues and visitors also requested to pay a fee equal to the regular dues in order to get into the sessions. This was necessary to meet expenses and it has put the Association on a business basis. Approximately \$400 a year is paid alone for the expenses of speakers on our programs, in order to secure talent who have a wide reputation and have something especially to offer practitioners who attend. The Association has no other income than fees and dues and is, therefore, put to the test of making the meetings such that they are sufficiently attractive to members to keep up their connection. Even the entertainment features are handled largely through the Chamber of Commerce, which makes the meetings free of burden to local people. The hotel allows the Association the income from exhibitors as an inducement to be the headquarters. Putting the Association on a business and merit basis, has worked out very well, with little opposition, and it has kept the organization free of all outside influence in getting up the programs and in the conduct of its affairs.

The meeting this year was postponed from the summer to the late fall, as a courtesy to the A. V. M. A. and the Missouri State meetings, both of which were scheduled close to our usual meeting time. Every effort has been made to hold our meetings so that they do not conflict with state or national meetings. Members of the Missouri Valley must be members of their state associations. The objection made by some that the Missouri Valley detracted from the A. V. M. A. or state associations has been met by holding only one meeting a year and by shifting our meetings to meet emergencies. The next meeting will be held in Omaha, in July, and already a splendid program is under way.

E. R. STEEL, *Secretary.*

### HORSE ASSOCIATION OF AMERICA

How the man hours in production of an acre of corn have been reduced from 18 to 11 $\frac{2}{3}$  hours per acre on his farm was told in

an address by W. S. Corsa, farmer and breeder, of White Hall, Ill., at the annual meeting of the Horse Association of America, held at the Palmer House, Chicago, December 5, 1928.

Mr. Corsa explained that this reduction had come about through use of 8- and 12-horse teams, as demonstrated on his farm two seasons ago by the Horse Association of America. "I believe," he said, "that in a comparatively short time the standard of the Corn Belt will be the 3-bottom plow with or without a section of harrow attached, pulled by eight horses, as against the 2-bottom plow and four horses, so generally in use today.

"We have proved in our own experience the economy of the big hitch in man labor, its economy in time used, its economy in maintenance, in replacement, in equipment, and in simplifying farm life and farm work. There are also strong arguments for its economy in mobility, its salvage value, the fertility its use returns to the soil, and its lack of destruction in operation on farm soil."

Col. George G. Seaman, of Taylorville, Ill., also was a speaker on the banquet program of the Horse Association of America, his topic being the importance of horses to the Army and to national defense.

Speakers at sessions during the day were: A. B. Hancock, noted race horse breeder, of Paris, Ky.; Emil Lefebure, a city representative to the Horse Association of America; A. E. Brandt, of Iowa State College, Ames, Iowa; and Prof. M. P. Jarnigan, head of the Animal Husbandry Department of the Georgia State College of Agriculture. Mr. Brandt's talk dealt with the horse- and mule-pulling contests and their importance to a knowledge of scientific breeding and training of draft animals, while Professor Jarnigan's address concerned the big-team hitches and their agricultural importance to the South.

Reports on the year's work were given by the officers: Wirth S. Dunham, of Wayne, Ill., president; Wayne Dinsmore, of Chicago, secretary; and William M. Brezette, of Indianapolis, treasurer. Officers elected for the coming year are: Wirth S. Dunham, president; A. B. Hancock, first vice-president; J. L. Elliott, of Racine, Wis., second vice-president; W. M. Brezette, treasurer; Wayne Dinsmore, secretary, reelected for a three-year term; and William E. Murphy, of Philadelphia, assistant secretary.



Directors, as chosen, are: H. A. Bascom, of Boston; George S. Bridge, of Chicago; W. S. Donham and J. W. Boyt, of Des Moines, Iowa; and R. P. Carr, of Buffalo, N. Y.

### **WESTERN NEW YORK VETERINARY MEDICAL ASSOCIATION**

The fifteenth annual meeting of the Western New York Veterinary Medical Association was held at Buffalo, N. Y., December 13, 1928.

The meeting opened with a clinic at the headquarters of the Erie County Society for the Prevention of Cruelty to Animals, during which Dr. H. J. Milks, of the New York State Veterinary College at Cornell University, performed the "debarking" operation. After the clinic a business session was held and officers were elected for the ensuing year, Dr. B. R. Wilbur, of South Dayton, being chosen as President, Dr. L. J. Tillou, of East Aurora, Vice-President and Dr. F. F. Fehr, of Buffalo, Secretary-Treasurer. Dr. W. D. Bennett, of Batavia, was elected as Director for a term of three years and Dr. E. L. Volgenau, of Buffalo, was re-elected for a similar term as Director. Two new members were voted upon and elected: Dr. H. F. Wilder, of Buffalo, and Dr. A. L. Rindell, of Rochester.

The ladies were entertained during the afternoon by Mrs. E. L. Volgenau and attended a theater party in the evening.

A banquet was served at 6:30 for the members and their guests, after which the meeting reconvened and a program was rendered. Dr. F. E. McClelland, of Buffalo, told of his experiences on a recent trip abroad, describing the various veterinary hospitals and colleges visited. Dr. J. V. Hills, of Gowanda, read a paper on his experiences with the rumenotomy outfit. Dr. H. J. Milks gave a short talk on the results of the debarking operation on dogs. Dr. E. C. Cleveland, of Cattaraugus, reported on the A. V. M. A. meeting in Minneapolis, after which the meeting adjourned until the summer semi-annual in 1929.

**F. F. FEHR**, *Secretary-Treasurer.*

### **SOUTHWESTERN MISSOURI VETERINARY MEDICAL ASSOCIATION**

A meeting of the Southwestern Missouri Veterinary Medical Association was held at Mount Vernon, Mo., November 14, 1928. Dr. B. M. Troxel, of Mount Vernon, is Secretary and provided a splendid program for the visiting veterinarians and their wives.

## NECROLOGY

---

### FREDERICK L. STEVENS

Dr. Frederick L. Stevens, of Portland, Maine, died August 1, 1928. The cause of death was carcinoma of the pancreas and cirrhosis of the liver.

Born at Lewiston, Maine, October 24, 1860, Dr. Stevens attended public schools, Wilton Academy and University of Maine. From the latter institution (at that time the Maine State College of Agriculture and Mechanic Arts) he received the degree of B. S. in 1884. He then engaged in farming and school teaching, later entering the New York College of Veterinary Surgeons, from which he was graduated in 1895.

In 1899, Dr. Stevens entered the service of the U. S. Bureau of Animal Industry, after having been in private practice for four years. He was stationed at New York City and Boston. Later he was in charge of B. A. I. work at Syracuse, N. Y. On being transferred to Portland, Maine, Dr. Stevens was assigned to tuberculosis eradication work.

Dr. Stevens joined the A. V. M. A. in 1922.

N. K. F.

---

### JOHN G. EAGLE

Dr. John G. Eagle, of Kansas City, Mo., died November 20, 1928. He was a graduate of the Kansas City Veterinary College, class of 1904, and accepted an appointment as veterinarian in the U. S. Bureau of Animal Industry immediately after his graduation, serving in that capacity until 1914, when he resigned to accept the position of vice-president of the Eagle Serum Company, of Kansas City.

In 1924, Dr. Eagle was elected to the lower house of the City Council of Kansas City and in 1925 he was appointed Superintendent of the Detention Home.

Dr. Eagle was of sterling quality, having made a splendid record while in the government service, was recognized as efficient, honest and conscientious in the production and sale of biologics, and a city official of integrity. He was of a family of veterinarians, having three brothers, Dr. R. F. Eagle, of the Wilson Packing Company, Dr. Thomas Eagle, of the Tuberculosis Eradication Division of the B. A. I., Dr. Wallace Eagle, present owner of

the Eagle Serum Co., a brother-in-law, Dr. Robert B. Grimes, veterinarian for the Kansas Livestock Commission, and two cousins, Dr. A. F. Eagle, city veterinarian of San Francisco, and Dr. J. N. Eagle, of Kansas City, Kans.

Dr. Eagle joined the A. V. M. A. in 1913. He served as a member of the Audit Committee, 1922-1923.

---

### CHARLES R. WITTE

Dr. Charles R. Witte, of New Britain, Conn., died by his own hand, November 19, 1928. Despondency caused by a protracted illness prompted the act. Dr. Witte was 81 years of age, a native of Germany and for a number of years, following his graduation from the American Veterinary College, in 1896, was a general practitioner. During recent years he held the position of meat inspector at the municipal abattoir in New Britain. Dr. Witte joined the A. V. M. A. in 1899. He is survived by one daughter, one son, one sister and one brother.

---

### R. G. MENEFFEE

Dr. R. G. Menefee, of Towanda, Kansas, came to an untimely end by drowning in a small lake near Parsons, Kansas, November 23, 1928. He was a graduate of the Kansas City Veterinary College, class of 1916. Through his unfailing courtesy, good business judgment and loyalty to associates, Dr. Menefee made a host of friends for himself. His loss will be seriously felt in veterinary circles.

R. R. D.

---

### JOHN SAMUEL ELLIS

Dr. John S. Ellis, of Eminence, Kentucky, died at his home, November 30, 1928, after an illness of several months. He was 59 years of age. Dr. Ellis attended the Ontario Veterinary College and later the Ohio Veterinary College, Cincinnati. He was graduated from the latter in 1895. He also attended the College of Medicine, University of Louisville, and received the degree of M. D. from this institution.

Dr. Ellis is survived by his widow, one sister and five brothers.

---

---

**WILLIAM HENRY MATTSON**

Dr. William H. Mattson died at his home in Media, Pa., December 6, 1928. He had just passed his 79th birthday, having been born at Concord, Pa., December 5, 1849. After attending common school and Concordville Seminary, he entered the University of Pennsylvania Veterinary School and was graduated with the class of 1889. He located at Chester Heights, Delaware County, Pa., where he engaged in general practice for many years, finally retiring to spend his declining years at Media.

Dr. Mattson was an able practitioner, kindly and much liked by all who knew him. He joined the A. V. M. A. in 1911 and was a life member of the Pennsylvania State Veterinary Medical Association.

G. A. D.

---

**WILLIAM H. THOMAS**

Dr. William H. Thomas, of St. Joseph, Missouri, died December 10, 1928, after an illness of almost nine months. On March 20, he was stricken with a paralytic stroke. Three weeks later, he suffered a second stroke and the third and fatal attack came December 7.

Born in DeKalb County, Missouri, December 15, 1866, Dr. Thomas received his veterinary training at the St. Joseph Veterinary College. He was graduated in 1913. He joined the A. V. M. A. in 1927.

---

**WOOD T. METCALF**

Dr. Wood T. Metcalf died at DeWitt, Nebraska, December 19, 1928, from a complication of pneumonia following an attack of influenza. Dr. Metcalf was born at Liberty, Nebraska, July 21, 1893, and attended the Kansas City Veterinary College, the Chicago Veterinary College and the Indiana Veterinary College. He was graduated from the latter in 1921 and immediately entered private practice at DeWitt, Nebraska. There he built up a very lucrative practice, in a community where no one thought that a practice existed. He was looked upon as one of the most optimistic and enthusiastic veterinarians in Nebraska and he was a man who made himself felt in his community. He was a Mason, a member of several civic organizations and the Nebraska State Veterinary Medical Association.

F. P.

---

---

**THOMAS EDWARD LECLAIRE**

Dr. Thomas E. LeClaire, of Calgary, Alberta, Canada, died at El Monte, California, November 4, 1928. He was a graduate of Laval University, class of 1890, and joined the A. V. M. A. in 1910.

---

**C. H. ABBOTT**

Dr. C. H. Abbott, of De Smet, South Dakota, died November 24, 1928. He had been confined to his home for several months, following an injury to his leg. He was a registered non-graduate practitioner and had been located at De Smet since 1901.

---

**JAMES S. CULBERT**

Dr. James S. Culbert, of Portland, Indiana, died at the Jay County Hospital, December 17, 1928, following an illness due to uremic poisoning. He had been in poor health for about a year and had been in the hospital for about a week.

Born in the province of Ontario, Canada, November 27, 1857, Dr. Culbert removed to the United States at the age of seventeen. He first located in Michigan and nine years later went to Portland. He was a great lover of horses and decided to study veterinary medicine. He entered the Columbia Veterinary College, New York City, and was graduated in 1887. He returned to Portland to practice and remained there the rest of his life.

Dr. Culbert was active in civic affairs and took a deep interest in Republican politics. He was Postmaster at Portland from 1901 to 1906. He was a member of the Jay Lodge No. 87, F. & A. M., and an active church worker. He is survived by his widow, one daughter, one son, three brothers and four sisters.

---

**CHARLES H. WILMOT**

Dr. Charles H. Wilmot, of Chickasha, Okla., died at Little Rock, Ark., May 28, 1927. He was born at Rockport, Ind., September 22, 1891, and was a graduate of the Terre Haute Veterinary College, class of 1917. He located at Chickasha one year later and practiced there until called into the service of his country in the late war. He served as second lieutenant in the Veterinary Corps. Upon his discharge he returned to private practice at Chickasha. He joined the A. V. M. A. in 1917.

---



Our sincere sympathy goes out to Dr. F. M. Douce, of Marion, Ohio, in the death of his wife, November 23, 1928; to Dr. and Mrs. Henry Singleton, of Houston, Texas, in the death of their daughter, Ada Mae, in her 17th year, November 24, 1928; to Dr. J. R. Mohler, of Washington, D. C., in the death of his mother, Mrs. Harriet Robbins Mohler, of Philadelphia, at the age of 88 years, November 26, 1928; to Dr. M. H. Doller, of Danville, Ky., in the death of his wife, December 1, 1928; to J. S. Bengston, of Chicago, Ill., in the death of his father, December 2, 1928; to Dr. Walter D. Jensen, of Grant, Nebraska, in the death of his wife, after a brief illness, December 9, 1928; to Dr. J. L. McEwan, of Frankfort, Ill., in the death of his wife, December 19, 1928.

---

## PERSONALS

---

### MARRIAGE

Dr. Gerry B. Schnelle (U. P. '26), of Boston, Mass., to Miss Helene Emily Alenty; of Hampton Falls, N. H., November 22, 1928, at Hampton Falls.

---

### BIRTHS

To Dr. and Mrs. R. A. Hendershott, of Trenton, N. J., a son, Donald Robert, September 3, 1928.

---

To Dr. and Mrs. E. J. Frick, of Manhattan, Kans., a daughter, October 4, 1928.

---

To Dr. and Mrs. T. M. Dick, of Little Rock, Ark., a daughter, Jane Frances, October 5, 1928.

---

To Dr. and Mrs. Irving Moles, of Central City, Iowa, a son, Marvin Robert, October 10, 1928.

---

To Dr. and Mrs. Roy C. Johnston, of Monticello, N. Y., a daughter, Vera Ann, November 19, 1928.

---

To Dr. and Mrs. G. A. Roberts, of Lavras, Minas, Brazil, a son, Thomas Glenn, December 11, 1928.

---

## PERSONALS

---

Dr. W. G. Irvin (Cin. '15), formerly of Owingsville, Ky., is now at Lancaster, Ky.

---

Dr. F. L. Rogers (O. S. U. '26) has removed from Granville, Ohio, to Cadiz, Ohio.

---

Dr. O. B. Neely (Iowa '24) has removed from Franklin, Tenn., to Lebanon, Tenn.

Dr. Dale W. Glascock (Iowa '28) has moved from Audubon, Iowa, to Havelock, Iowa.

Dr. E. E. Nelms (Chi. '16), formerly of Fairview, Ill., has located at Smithfield, N. C.

Dr. C. E. Chapin (Chi. '14), of Fremont, Ind., is a breeder of pure-bred Jersey cattle.

Dr. Milton R. Sharp (Colo. '26), formerly of Tulsa, Okla., is now located at Ardmore, Okla.

Dr. I. W. Vinsel (Chi. '16), has changed locations from Baker, Mont., to Miles City, Mont.

Dr. O. E. Thomas (O. S. U. '28) has changed locations from Willard, Ohio, to Paulding, Ohio

Dr. D. B. Pellette (K. S. A. C. '12) has removed from Monticello, Fla., to Green Cove Springs, Fla.

Dr. S. A. Alexander (O. S. U. '16), of Monroe, N. C., has been elected a member of the State Legislature.

Dr. C. McCandless (Chi. '15) has removed from Lisbon, Ohio, to Salem, Ohio. Address: 370 Lincoln Ave.

Dr. Roy C. Johnston (Corn. '20) has changed his address from Monticello, N. Y. to Livingston Manor, N. Y.

Dr. W. G. Thomson (Ont. '08) has removed from Vancouver, B. C., to 10407 107th Ave., Edmonton, Alta.

Dr. A. L. McNabb (Ont. '23), of Toronto, Ont., has been appointed Director of the Ontario Provincial Laboratory.

Dr. Hal J. Rollins (K. C. V. C. '16), of Rockingham, N. C., is now serving as one of the county commissioners of his county.

Dr. T. H. Agnew (Ont. '96), formerly of Lamanda Park, Calif., gives us a new address: 80 N. Daisy Ave., Pasadena, Calif.

Dr. G. B. Henno (San Fran. '07), will remove to his new hospital, 530 Arquello Boulevard, San Francisco, Calif., on February 1.

Dr. Wm. B. Kohn (U. P. '18), formerly located in Philadelphia, Pa., is now in Atlantic City, N. J. Address: 101 So. Indiana Ave.

Dr. Charles C. Rife (Corn. '25) is now associated in practice with Dr. Lowell J. Kepp (Chi. '17), at 420 Edgewood Ave. N. E., Atlanta, Ga.

Dr. S. W. Brown (O. S. U. '07), of Hamilton, Ohio, will open a new veterinary hospital at 323 South Front Street, on or about January 5.

Dr. John R. Mohler (U. P. '96), was elected an honorary member of the Swedish Veterinary Association, at the meeting held October 20, 1928.

Dr. Claude E. Page (Ind. '12), of New Roads, La., has been appointed assistant state veterinarian of Louisiana and is now located in Baton Rouge.

Dr. W. L. Davis (K. C. V. C. '10), who is engaged in tick eradication work in Arkansas, spent a part of his vacation visiting his old home in Kansas in November.

Dr. A. W. Heflin (St. Jos. '19), of Gower, Mo., made a good showing in the roadster classes at the American Royal horse shows, in Kansas City, November 17-24, 1928.

Dr. E. W. Berg (K. C. V. C. '10), of St. Paul, Minn., had a nice string of horses competing in several hunter and jumper classes at the recent American Royal horse show.

Dr. P. A. Johnson (O. S. U. '08), assistant state veterinarian of Arkansas, recently returned from a long automobile tour, visiting the principal points of interest in the West.

Dr. Arthur Trickett (K. C. V. C. '01), of Kansas City, Mo., was the official veterinarian to the American Royal Stock Show, held in Kansas City, Mo., November 17-24, 1928.

Dr. W. B. Davidson (Ont. '18), formerly of Estevan, Sask., has joined the staff of the Health of Animals Branch, Canadian Department of Agriculture, and is now located in Winnipeg.

Dr. J. I. Neal (K. C. V. C. '15), of Sanford, N. C., is a director of the Lee County (N. C.) Fair Association and is doing a valuable work in promoting pure-bred live stock in his community.

Dr. D. D. Conner (K. C. V. C. '11) has reported for duty in connection with tick eradication work in Arkansas, after an absence of several months in the state of Mississippi on the same project.

Dr. E. H. Connell (K. C. V. C. '16), of Mount Vernon, Mo., was a competitor in some of the roadster and five-gaited saddle horse classes at the recent American Royal horse show, in Kansas City.

Dr. Harry Lebeson (O. S. U. '16), who has been a member of the B. A. I. meat inspection force at Detroit for a number of years, has resigned his position and has gone to Chicago, where he is associated with his brother in a new line of work.

Dr. Roy Rowe (Corn. '11), of Millerton, N. Y., has been promoted from Veterinarian to Assistant Manager of Production of the Borden's Farm Products Company. Dr. Rowe has his headquarters at 110 Hudson St., New York City.

Dr. C. L. Sanders (Cin. '16), of Dayton, Ohio, addressed the newly formed Rabbit and Fur Association, at the Dayton Y. M. C. A., on December 21, on the subject of "Parasites and Tularemia." Dr. Sanders was elected an honorary member of the organization.

Dr. G. A. Roberts (K. C. V. C. '03) sailed from New York, December 29, for Porto Rico, where he has accepted a temporary position with the Polytechnic Institute at San German. After three to six months in Porto Rico, Dr. Roberts expects to return to Brazil.

Dr. C. H. Stange (Iowa '07), of Iowa State College, gave a talk, entitled, "Swine Diseases," over the radio, on October 30. This was given over the National Broadcasting Company network, from Chicago, and was heard from sixteen stations, as far east as Pittsburgh and as far west as Denver.

Dr. William C. Ring (U. P. '11), of Auckland, New Zealand, has been spending some time at the University of Pennsylvania Veterinary School, for the purpose of associating with those in the profession as well as renewing old acquaintances. This is Dr. Ring's first visit to the University since his graduation, over seventeen years ago. He traveled 11,000 miles to see his Alma Mater.